university of toronto
computing services

UTCS ComputerNews

Take the Computing Challenge

(Or "How to Make the Most of Computing Services." See pages 1 - 19 for details.)

Boot Up

Stop at printer and collect output.

Computer works just fine. Have a great day!

Your diskette is stuck in the disk drive. Advance 3 spaces.

You attend a UTCS short course. Move ahead 4 spaces.

Go directly to UTCS. Do not pass Boot Up. Do not collect output.

Call 978-HELP between 12 p.m. and 6 p.m., Monday to Friday.

Paper Jam: Have a cup of coffee.

Journal changes formatting guidelines. Call Text & Imaging Support Group for help. 978-3995.

You want to learn how to use Microsoft Word. Call 978-4565.

Power failure. Miss a turn.

Site License renewal time. Pay now or miss a turn.

Virus alert was false alarm. Move ahead 1 space.

Free subscriptions. 978-4034.

Your computer won't start up. Is it plugged in?

System Error: Do some stretches while system reboots.

Software upgrade fixes bugs. Take another turn.

You need more memory to run MultiFinder. Call Microcomputer Support Group for technical advice. 978-4597.

UTCS is here to help.

Call Applications and Advising Support at 978-7109.

You manage to find UTCS at 4 Bancroft Ave. Pat yourself on the back.

A Trojan Horse erases your hard disk. Spend 3 days reinstalling everything.

Advising answers your questions.

Programming code needs deciphering. Go back 4 spaces.

Your document won't print. Go back 2 spaces.

CHAOS in your computer? Call the SNAC Group at 978-6509.

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This newsletter was entirely produced on a Macintosh using PageMaker and other related Macintosh software.

Let's Talk About It: Reorganization

Warren C. Jackson
wcj@vm.utcs.utoronto.ca

Well, Gentle Reader, another polemic from me about a watershed for UTCS. This seems to happen about every four years or so. As you will read in the article below, we are planning to reorganize UTCS to some extent, fairly shortly. In the words of my boss, Dave Sadleir, you should not consider that there are any "sinister" aspects to such a move (well none that are purposefully sinister anyway). It is the last shoe to drop in the other Computing and Communications organizational changes you will read about in this issue. What will emerge will be an organization which will still be dedicated to meeting your needs and aspirations. We obviously can't please everyone completely (certainly never at a university!), but I think no one will be totally disenfranchised by our moves.

I am still contemplating exactly the shape the reorganization will take, in terms of which new and old functions are aggregated into units, how the units fit into sections, and which people will be in the units.

You may well ask why we should be reorganizing. There is a number of reasons. First, with the appointment of a Vice President, Computing and Communications (C and C), to whom UTCS reports, there are opportunities for more intimately coordinated efforts between the organizational units reporting to the VP, C and C. Within this envelope, there is a reasonable number of new areas where we intend to concentrate our efforts. In many cases, these are areas in which we haven't historically been involved, except perhaps in some sort of facility management role. In other cases, we want to bring more specific organizational focus to our efforts in support of a given group or subject area. If I were to characterize, in the broadest general sense, our change in emphasis, I would say we are trending toward greater alignment with overall university priorities, some of which, like the application of information technologies to undergraduate education, are emerging as areas of greatly expanded emphasis.

We are not going to add any people to do these new things, so obviously, we will be shifting some of our people into new units with new mixes of functions. This means that we will be shifting from, or deemphasizing, certain things we have done in the past. Hopefully, you will still all get an acceptable level of service for the things you have used UTCS for even after the reorganization. If you do not, or if you have particular sacred cows you feel shouldn't be touched, please let me know. When we have decided exactly how we are going to reorganize, I will spell it all out in excruciating detail, giving the reasons for the changes in all cases. You may not agree with the reasons, but you will at least know what they are.

A Guide to the UTCS Information Centre

This issue of *ComputerNews* provides an overview of the various groups that make up one area of UTCS: the Information Centre.

UTCS' mandate is evolving as the various functions which are the responsibility of the Vice President, Computing and Communications are rationalized across the organizations reporting to him. The mandate from the 1989/90 UTCS Annual Plan is still probably fairly robust in reflecting our thrust. It is "to encourage and support the use of information technologies across campus, and to plan, implement, and operate common-carrier networks and certain appropriate central computer facilities." All of the department's facilities and services are available to U of T faculty, staff, and graduate students.

The Information Centre, along with the other sections within UTCS, is going to be reorganized to some degree in the near future. However, the user-support functions presented here will still be provided in some form, and the contacts provided will still be useful.

Above all, UTCS is a service oriented department. Whether you are an experienced user, or a newcomer to the world of computers, we will do our best to help you meet your computing challenges.

The **Applications and Advising** and **Central Advising** Groups are available Monday to Friday, from 12:00 p.m. to 6:00 p.m.

The **Microcomputer Lab** is open Monday to Friday, from 8:45 a.m. to 6:00 p.m. The Micro Lab is available from 5:00 to 6:00 p.m. by special arrangement only.

Hours of Service:

The UTCS Information Centre is open from Monday to Friday, 8:45 a.m. to 5:00 p.m.

Restrictions on Use:

Generally, services are available to U of T Faculty, graduate students, cross-appointed researchers, and staff.

Cost of Services:

Most consulting services are free to the aforementioned groups.

The Marketing Representative is available to organizations affiliated with the University of Toronto and to other organizations (e.g., government and commercial) who cannot find equivalent services elsewhere.

Rates for the **Marketing Representative** are available at the UTCS Accounting Office. Call 978-7148 for details.

Information Centre services costs vary depending on the service. External customers pay higher fees for courses; Micro Lab use is available by special arrangement.

Contact the **SNAC** group to find out about service rates.

Who should I call?

Applications and Advising Support		**978-HELP**
For more information	Alex Nishri	978-7109
Central Advising		**978-HELP**
For more information	Dariusz Dabek	978-6878
Information Services		
ComputerNews		978-4034
Information Office		978-4990
Microcomputer Lab		978-5601
Short Courses		978-4565
FAX		978-7159
For more information	Patricia Hood	978-2066
Marketing Representative		**978-6875**
For more information	Ihor Prociuk	978-6875
Microcomputer Support Group		**978-HELP**
For more information	Terry Sanderson	978-4597
Statistical and Numerical Analysis Group		**978-HELP**
For more information	Barry Lay	978-6509
Text/Imaging Support Group		**978-HELP**
For more information	John Bradley	978-3995

The 978-HELP line is in operation Monday to Friday, 12:00 p.m. - 6:00 p.m.

Applications and Advising Support answers inquiries about electronic networks, terminal emulators, and operating systems.

Applications and Advising Support

Applications and Advising Support provides the following services to the U of T community:

Network Applications

- provides help in acquiring packages
- provides assistance with sending electronic mail or files via local and international networks

Terminal emulators

- answers questions about ProComm and Kermit (for Mac and PC)
- distributes ProComm and Kermit (for Mac and PC)
- provides assistance with Telnet and FTP

Operating systems

- provides assistance with command languages
- solves problems with operating systems such as PC DOS, Mac OS, UNIX, Microsoft Windows, CMS, OS/2, etc.
- provides assistance with utilities

Just ask us ...

Q: I just bought a modem for my PC and I got ProComm from you. Why doesn't my setup work?

A: Make sure your modem is wired correctly. If it is, check the modem settings and the ProComm "setup" parameters. If everything is set up properly but your system still doesn't work, call 978-HELP for further advice.

Q: We have a Macintosh network in our area and we want to exchange electronic mail. Is there a package to do this?

A: Yes. UTCS has copies of Microsoft Mail and CE Software QuickMail for evaluation, and can sublicense QuickMail at an attractive price. Also, UTCS will offer a gateway facility allowing Macintosh QuickMail users access to international research computer networks.

Q: I am running Windows 286. Is it worth upgrading to Windows 3.0?

A: We have a copy of Windows 3.0 we can demonstrate. We can also give you the advantages and disadvantages of such an upgrade.

Kent Weaver, Robarts Library

The Inter-Library Loan Evolution

One of the most integral parts of any university campus is the library. Whether there are many or few, the libraries are like large data storage units. Facilitating data manipulation is an evolutionary process — evolutionary because it takes time to develop and implement technology, and because it takes time to adapt to the technology. Inter-Library Loan (ILL) is one of the places where evolution is currently taking place. The International Standards Organization is working on establishing an ILL protocol which will set the standard for ILL systems around the world. What ILL systems, you wonder? One system that conforms to the proposed standard is the ILL system developed by Computing Services for the University of Toronto Science and Medicine Library.

Document Delivery, at the Science and Medicine Library, is the old book delivery service and Inter-Library Loan service rolled into one department. Kent Weaver, who works in this department, describes their services as “filling requests for documents and reading materials from the affiliated teaching hospitals and all of the faculty, staff and students here at U of T. We get requests from libraries as far away as the University of Moscow. They say, ‘We see that you have a copy of such and such. Please send it,’ and we send them either the document, or we fax, or mail a photocopy [depending on the particular copyright laws attached to the document]. We deal somewhere in the vicinity of 9,000 requests or more per year.” In the past, these requests have been written on paper slips, picked up by courier and delivered to the particular library that can fill the request. Not only was this a time- and money-consuming way to make requests, but it also consumed a great deal of paper. Not so with electronic mail. UTCS wrote a program for Document Delivery that runs over the mail server on UNIX. With this system, the requests are sent electronically, received almost immediately, and there is less chance of losing a request in a paper shuffle.

The current system is used to receive requests. In the future, Document Delivery would like to provide a request monitoring function which would allow the person making the request to find out the status of his or her request. A way to keep track of requests would provide useful daily and weekly statistics, as well as a storage system for filing back requests. Says Alex Nishri of Applications and Advising Services, “The ultimate end to this is far in the future when a researcher will be able to sit down at his or her computer, enter the name of the document he or she wants to view, and see it on the screen in seconds.”

Reduction in Advising Services

Alex Nishri
nishri@utcs.utoronto.ca

Effective September 2, 1990 the Advising Office will no longer be open weekday mornings. These reduced operating hours are necessary due to two vacant Consultant positions frozen pending a reorganization of Computing Services. During this period our lines will be open Monday through Friday, 12:00 p.m. to 6:00 p.m. only. We apologize for any inconvenience this may cause you.

Apple Research Partnership Program (ARPP)

The ARPP program provides five senior students who work with University of Toronto researchers and instructors who are developing original tools or uses for the Macintosh. The students are employed by Apple Computer Inc. and jointly supervised by the University and Apple. They can assist by finding technical details of Macintosh capabilities, by helping to identify available resources, and by building working prototypes. If you have some development which you want considered as an ARPP project, please contact Alex Nishri at 978-7109. The following are short descriptions of two current ARPP projects.

Project: Blissymbolics Research

Peter Reich, a professor in the departments of Linguistics, Psychology and the Cognitive Science and Artificial Intelligence program, is involved in research using Blissymbolics. He has collaborated with ARRP in multiple phases of his research. He is interested in creating a computer-based communication device for persons whose primary communication method is the use of a symbol system such as Blissymbolics. Blissymbolics is a graphics-based communication system which has its own syntax and grammar. Each symbol is composed of a combination of shapes. These attributes of the "language" must be taken into account when designing a computer-based system.

ARPP's Involvement

Development of such a system is well-suited to the Macintosh due to the graphic nature of the Blissymbol system. ARPP was involved in numerous phases of this project, each phase building on the previous. A Bliss-Template font was developed in order to quickly and accurately generate a symbol without extensive drawing. A method by which these fonts and listings of Blissymbols could be used within other applications was explored in collaboration with an ARPP consultant, and a demonstration prototype was developed using HyperCard.

These components were then used to create a prototype of a simple text processor. The text processor allows the user to create messages using Blissymbols, the symbols are then translated into English and spoken through Macintalk. The computer plays the role of someone who is familiar with the grammar and syntax of Blissymbol communication and takes the Bliss phrase and translates it into grammatically-correct English. As a result of this early research, Peter Reich, in collaboration with ARPP and the Hugh MacMillan Rehabilitation Centre, has applied for and received a Social Science and Humanities Research Council (SSHARC) grant.

Project: Electronic Medical Records

Patient charts in hospital emergency rooms are traditionally generated by hand. Often the charts are difficult to read and therefore do not provide sufficiently accurate and detailed information. Dr. David Caspari at the Toronto Hospital is involved in the development of a system to be used in the emergency room which would generate an electronic medical record for each patient. The system, to be primarily used by physicians, will generate patient charts and also allow for electronic auditing of the charts. Dr. Caspari, an Assistant Professor with the Department of Medicine, Faculty of Medicine, and Staff Emergency Physician at the Toronto Hospital, approached ARPP for assistance in designing the system.

ARPP's Involvement

Two ARPP consultants worked with Dr. Caspari and his group, each bringing to the project his or her specific expertise. The prototype system was eventually implemented using HyperCard. One consultant brought her understanding of medical illustration issues and use of the Mac to the project. Hand-drawn illustrations were scanned, touched up in MacPaint and imported into HyperCard. Ongoing development work is continuing at the Toronto Hospital with ARPP consultants providing assistance.

More information concerning ARPP can be found in *ComputerNews* issue #259, November/December 1989, and by contacting ARPP at 978-7728.

Advising provides advising/consulting on command languages, high-level languages, editors, communications packages, and operating systems for PC and Macintosh microcomputers and for CMS and UNIX mainframe systems.

Central Advising

Central Advising provides the following services to the U of T community:

- supports computer inquiries about software and hardware use and problems
- answers short technical questions in five minutes or less
- sets up appointments with a consultant or specialist if the problem/question requires more time
- distributes software: ProComm for PC, PC/MacKermit, anti-virus programs, U of T crest

Just ask us ...

Q: My program/application is not performing a feature as expected.
A: We may be able to explain why a feature works the way it does for your setup. If we need to, we can simulate your situation, since we have the hardware (PC, Mac, and mainframe links) and the software at the HELP desk.

Q: I deleted my file by accident. *or* I have a file my application won't retrieve/open. *or* I have a bad disk.
A: We have the knowledge and the access to Mac and PC utilities that can assist you in recovering deleted and corrupted files. If you need to, you can come to the HELP desk and an advisor will assist you. However, there is no assurance that your files or disks are recoverable.

Q: How do I send send electronic mail to a colleague?
A: We will show you the e-mail alternatives, and how to get mail to your colleague.

“UTCS Advising Desk, may I help you?”

The Advising Desk, available to University of Toronto faculty members, staff members, and graduate students, answers computer-related questions between the hours of 12:00 p.m. and 6:00 p.m., Monday through Friday. Our phone number is 978-HELP (978-4357).

“Hi, I know that there are online services here at the University that allow me to access the Library’s ‘FELIX’ catalogue at home on my computer. How do I use these services?”

“Most of these connections are made with the addition of a modem and communications software. Here at the Advising Desk, we distribute communications software for both the MS-DOS (PC) and Apple Macintosh microcomputers free of charge to University of Toronto microcomputer users.”

If you need a more detailed examination of the problem, you can make an appointment with one of the full-time consultants.

When I try to look at one of my files, my PC gives me an error message. Why is it doing this?”

“If you are sure that you have specified the command correctly, then there may be a problem with the disk where the file or startup information is stored.”

The Advising Desk can help resolve such a problem by reviewing the DOS command you used, or recommending utility software that can scan your disk for potential problems.

“I can’t get my printer to print my WordPerfect document. What’s wrong?”

“WordPerfect has ‘printer driver’ software that it uses to print on different types of printers. If you have chosen a printer driver that doesn’t correspond to your printer, then the program doesn’t know how to tell your specific printer to print your document.”

In this case, the advisor on duty would find out what type of printer the caller is using, and what driver he/she has selected. Perhaps the problem lies in the hardware setup, either in the “port” or plug on the back of the computer to which the printer cable attaches, the cable connecting the computer to the printer, or the setup of the printer. The advisors will ask questions and, possibly, make recommendations.

No problem is trivial at the UTCS Advising Desk.

Information Services provides Information Office and Microcomputer Lab services, administers and teaches short courses, and publishes ComputerNews.

Information Services

Information Services provides the following services to the U of T community:

Microcomputer Lab

- laser printing, scanning, typesetting, document conversion, and slide-making services by appointment
- software demonstrations
- FAX service

Information Office

- licenses and/or sells microcomputer software and computer-related documentation
- redirects general queries to most suitable consulting group
- maintains a library of computer-related periodicals

Education Services

- schedules and administers Short Courses on microcomputer software
- two classrooms: PC and Macintosh
- maximum of 10 students per class
- courses for departments taught on request

ComputerNews

- published 8 times each year
- free subscriptions on request
- contains discussions, news, and reviews of computing issues and software of particular interest to the members of the University of Toronto

Just ask us ...

Q: Do you sell software?
A: The Information Office sells the text management package Archivist, and it licenses, on a yearly basis, the statistical packages SAS, SPSS, and SYSTAT. A yearly license is also available for the WATFOR/77 programming language. A site license is also available for WordPerfect 5.1. WordPerfect is widely used on campus; this site license provides inexpensive upgrades from older versions of the software. These software packages are available to members of the U of T community only. The Information Office will special-order Dragonfly products such as Nota Bene and Ibid, or provide academic discount coupons to U of T faculty, staff and graduate students.

Q: Can you tell me what courses you offer, when they are, and what they cost?
A: We offer 18 short courses, scheduled throughout the year. Very popular courses, such as Introduction to WordPerfect, may be offered twice a month, while more advanced courses, such as Intermediate SAS, may be offered once each quarter. Cost is based on the number of hours of instruction time. Courses span from 4 to 16 hours. See "Microcomputer Courses", elsewhere in this issue, for more specific information.

Q: How can I get on the mailing list for *ComputerNews*?
A: Send your complete mailing address (preferably a campus mail address), including building and room number, to:

ComputerNews Subscription
4 Bancroft Ave, Room 217
Toronto, Ontario
M5S 1C1.

Veronica Fisher, Designer, Robarts Library

Last-Minute Linos

One of the most frequented parts of UTCS is the Microcomputer Lab, where people from all across campus come to do printing, scanning, typesetting, and other specialized microcomputer tasks. When her own Mac II just isn't enough, Veronica Fisher, the graphic designer for the Robarts Library, comes to Computing Services. From exhibition catalogues and brochures to forms and posters, she provides the library with anything that needs layout, design, or illustration.

Fisher principally uses the Microcomputer Lab for the Linotronic typesetter and the DEST scanner. She designs all of her work at the library then brings it to UTCS on disk. Fisher finds the service to be good all around. "They always try to squeeze me in when I have an emergency Lino to run. The biggest problem I've had is with the Linotronic breaking down. Once I was running a job, and the entire board had to be replaced."

Though most of her interaction with UTCS involves the lab, Fisher has also worked with the Text/Imaging group to manipulate scanned images. The part of the service which seems to please her most is the fact that UTCS follows up her enquiries. ". . . if they don't know something, they are pretty fearless about trying to find out. Many's the time I've made an enquiry and they've been pulling out books and making enquiries – and they get back to you."

Your Comments on . . . *ComputerNews*

I find your publication just what the doctor ordered. The articles...were well done and very informative. My only regret is that they were not available earlier so I could have my students read them.

Easy to read – articles were both timely and to-the-point.

Thanks for the renewal. Enjoyed some of the best written articles in *ComputerNews*. Keep up the good work.

Very helpful summary of services. Our department is planning to expand our computing capacity in the years ahead, and every member will be alerted to your services.

Interesting.

OK, but you could put the same amount of information on fewer pages (save the forests).

On the whole, this publication is a very high quality; an informative source of information. Each issue seems to get better. Congratulations!

Informative, but rather densely packed with highly technical items.

VERY GOOD READING!

I just want you to know that we read you willingly. You regularly fill a gap for many of us. After most issues arrive, there is always some talk in the corridors (this time about lap-tops), some request to the secretaries to phone you about shareware, etc.

And finally found on a subscription request form:

I have stopped stealing my colleagues'!!

Microcomputer Short Courses

Irene Rosiecki
rosiecki@vm.utcs.utoronto.ca

UTCS offers various noncredit microcomputer courses to faculty, staff, and graduate students of the University of Toronto. These courses cover a number of software programs available for the PC or the Macintosh. Whether you will be typing a thesis on a word processor, or working with spreadsheets, databases, or desktop publishing, we may be able to help you get started.

Our class sizes are small to allow for much individual attention. Continuing support is available upon completion of a course.

The following is a list of the microcomputer courses taught at UTCS:

- Introduction to dBASE IV
- Introduction to Desktop Publishing
- Introduction to Disk Operating System (DOS)
- Electronic Mail Seminar
- Excel on the Macintosh
- Introduction to FoxBASE+/Mac 2.0
- Introduction to HyperCard
- Introduction to Lotus 1-2-3
- Introduction to PageMaker
- ProComm Communications Seminar
- Introduction to SAS on the PC
- Intermediate SAS – Data Processing
- Intermediate SAS – Statistics
- Microsoft Word on the Macintosh
- Microsoft Word on the PC
- Introduction to WordPerfect 5.1
- Advanced WordPerfect 5.1 Topics
- Introduction to WordPerfect 5.1 for 5.0 Users

To find out about course dates and registration procedures, or to book a place in any of these courses, please contact Irene Rosiecki at 978-4565. Courses are filled on a first-come, first-served basis. The more popular courses fill up quickly, but waiting lists are maintained in case of cancellations.

The Marketing Representative assists external users in using UTCS mainframe and microcomputer services.

Marketing Representative

The Marketing Representative provides the following services to the U of T community:

- describes UTCS mainframe/micro services
- assists users with opening accounts
- resolves billing issues
- advises on questions with Lotus and Excel
- teaches UTCS noncredit short courses on Lotus and Excel

Just ask me ...

Q: How do I open an account with UTCS?
A: Discuss your requirements with the Marketing Representative, who will mail you the appropriate forms. Return these forms along with a covering letter indicating how you would like to be billed.

Q: Can you explain my online (storage) charges on CMS?
A: As the account holder, you tell CMS how much on-line space you want to reserve for your work. UTCS then bills you for the amount of space you reserve.

Q: Why did my formula change when I copied it to another part of my worksheet in Excel?
A: When you copy a formula, Excel adjusts the copied formula so that it has the same relative address references as the original.

Cherie Aitken, PROC STATS

The Relationship Continues. . .

Cherie Aitken has had a long relationship with UTCS. She worked at the University for 19 years, and while running the first computer terminal at the Faculty of Arts and Science, she started to meet the people at the computer centre. With the Arts and Science remote terminal, card reader and printer, and her interaction with people using FORTRAN, she gained enough knowledge to help other people in other departments with projects. After a period of time spent doing research at the Gage Research Institute, she decided to strike out on her own and formed *PROC STATS,* a one-woman show which crunches numbers and churns out statistics and presentation charts at the speed of light. Now her dealings with UTCS are on a commercial level. She works with Ihor Prociuk, UTCS' Marketing Representative, to purchase mainframe time and other services.

"In terms of getting help. . . They are a really good network. For advice on equipment; for helping me fix equipment. The house got hit by lightning two summers ago, and I'm protected with surge-protectors and everything, but the lightning came in through the modem, and completely burnt out the computer. I had to start from scratch. UTCS assessed the damage, and they were able to replace some of the boards and hold on to some of the equipment inside. I just had to replace the motherboard, the serial card, and the disk controller. Even though they were empty, I was able to save the floppies [drives] and hard disk."

The Microcomputer Support Group supports microcomputer services related to microcomputer hardware, systems software, and applications software.

Microcomputer Support Group

The Microcomputer Support Group provides consulting and information to the U of T community on:

- the selection of microcomputer systems, including IBM PCs and compatibles, Apple Macintoshes, and personal workstations
- the selection of peripheral equipment and accessories, such as modems, hard disk drives, controllers, projection panels, and surge suppressors
- certain application software, such as database languages, operating systems, and system utilities
- Local Area Network hardware and operating systems
- new computer hardware (we publish evaluations in *ComputerNews*)

These services are available both to individuals on campus and to University departments.

Just ask us ...

Q: What type of microcomputer should I buy?

A: There's no simple answer to this question, since so many factors are involved. The Microcomputer Support Group will help you clarify your needs and will recommend solutions based on such considerations as power, portability, compatibility with other devices, cost, and the type of work you'll be doing.

Q: How do we connect our machines so that we can share data, peripherals, and so on?

A: There are numerous methods for sharing computer resources such as printers. The Microcomputer Support Group can help you determine the most efficient and cost-effective way, whether it be installing a Local Area Network or simply buying cables.

Q: I have a large amount of research data to organize. What kind of computer package should I use?

A: A database is probably the type of program you'll need. Depending on the way you want to look at your data, you may need just a simple, flat database, or you may require a more complex, relational database package. Discuss your requirements and preferences with a member of the Microcomputer Support Group, who can help you decide which package best suits your needs.

Nira Sovig, Hospital for Sick Children

Programming for Productivity

Computers are entering the medical profession from almost every angle. Nursing students in various college programs are learning to use computers as part of their practical training. At the Hospital for Sick Children, Registered Nurse Nira Sovig is making inroads into computing for nurses.

The Neonatal Transport Team transports sick newborns from all over Canada to the Toronto-based hospital where they receive specialized treatment. Sovig, Data Manager for the Neonatal Intensive Care Unit, collects all of the demographic information on the babies transported by the team. For each case the nurses on the team handle, there are three hours of paperwork to fulfill the legal aspects of their job.

Using her dBASE programming skills, Sovig is working on a project to ease the amount of paperwork that the team nurses must do, and to provide easy access to statistics provided by the data for further research purposes. Her trials with the program discovered that it was too complicated to use, so she went to David Sutherland for assistance in rendering the program more user-friendly. Her program contains a menuing system, entry screens, and a basic connecting structure. The short-range goal of this project, which is actually allotted only a small percentage of Sovig's work time, is to run the program on laptop systems which will, in turn, increase the nurses' productivity by twenty percent. Nursing is still a very paperwork-oriented profession and there are mixed emotions surrounding the use of computers for data entry. Several of the nurses are very excited about the project, which is in a trial phase only.

Sovig is a self-starting, independent woman. In June of 1989 she started a dBASE users' group with her co-workers, which was later combined with the hospital's newly-formed Microcomputer User's Group (MUG). If her project is approved for full-time use by the Transport Team, Sovig is prepared; she has already researched the various brands, prices, and features to find a laptop suitable for the team. The long-range goal of her project is to compile the program so that it can run as a standalone application on the laptops. This will maximize the speed of the program, as well as eliminate the cost of purchasing dBASE for every machine.

Yousef Matuk, Department of Ophthamology

Exploring the Possibilities

When you purchase a computer, you usually get an input device (keyboard), a Central Processing Unit (the box), and a display/output device (monitor). This standard equipment not only looks good (usually this stuff is painted to match), but it is also designed for the average, sighted individual. Suppose you were visually impaired. Would you purchase a computer? Could you expect it to be of any use to you? Yes, says Dr. Yousef Matuk of the Department of Ophthamology.

Though he first heard about the possibilities that computers offer to the visually impaired from the CNIB, his actual exploration of these possibilities began when he got in touch with the UTCS Microcomputer Support Group.

So what replaces the monitor's visual function? A speech synthesizer is what Dr. Matuk began with. It reads out ASCII text in an electronic-sounding voice. When he heard about software that enlarges print on the monitor, he decided to get a demonstration copy to try it out. UTCS helped him to install the software along with the colour graphics card it required.

At the moment, he is using WordPerfect to enter documents, in cooperation with a closed circuit television system that enlarges the print to a size that he can see. Because of the visual focus of the research world, Dr. Matuk found himself in a do-or-die situation as far as using computers is concerned. He does not think that he would be using computers otherwise, and actually admits to the same general fear of them that many people experience. In the future, Dr. Matuk is hoping to acquire a scanner so that he can scan documents directly to the screen, and have the voice synthesizer read them to him.

The SNAC Group tests and supports software for data and numerical analysis on microcomputers, minicomputers, and mainframes.

Statistical and Numerical Analysis (SNAC) Group

The SNAC Group provides the following services to the U of T community:

Software Licenses

- maintains site licenses for a variety of statistical and numerical packages (e.g., SAS, SPSS, SYSTAT)
- arranges for licenses for new products of significant interest to the University

Consultation

- answers questions on the use of statistical and numerical packages
- discusses available packages suitable for solving particular problems
- assists with transferring data from one package to another

Education

- teaches short courses on statistical packages
- reports on techniques and new facilities in *ComputerNews*

Research

- investigates new products available for data and numerical analysis
- acquires test versions of new products for evaluation
- investigates new environments for existing products, and better methods for data interchange between them

Just ask us ...

Q: What kind of PC should I buy for statistical or numerical analysis?

A: This oft-asked question is as difficult to answer as “what kind of car should I buy”. The answer is a trade-off of desired function versus budget. In order for the PC to be usable for the next few years, it should have a 386 (or newer) processor to handle the new operating systems and programs coming out. In addition, you should put as much memory and hard disk capacity on it as you can afford. Very little runs in 640KB nowadays. A good cost performer is a machine based on the 386SX chip, which is the entry level version of the 386. Such machines provide 386 capability at AT prices.

Q: What is the current version of SAS?

A: We support SAS on a variety of platforms. For the PC, the current version is 6.04, which is a upgrade of 6.03 with a couple of new procedures and more graphics support. On CMS, we are running 5.18, with 6.06 in test. UNIX on SUN workstations and HP-UX systems is currently at the 6.03 level. Upgrade kits for converting a 6.03 PC license to a 6.04 one are available from the UTCS Information Office. If you are interested in other environments, for example the OS/2 version of SAS which is in beta test, please contact Barry Lay at 978-6509.

Q: Do I need a math coprocessor to run SAS or SPSS?

A: Neither SAS nor SPSS require a coprocessor, but both will take advantage of one if it is installed. Complex analyses such as multiple regressions and crosstabulations can have dramatic reductions in time for the cost of an extra chip.

Lillie Lum, Institute of Medical Sciences

Quantitative Analysis of a Qualitative Issue

Imagine, if you will, that you are a doctor explaining the treatment procedures for cancer to a patient of yours. You tell the patient about the course of treatment and about the side effects. When you inform the patient that they are free to ask questions of either yourself or the nurse, you feel that your part in their decision is through. Or is it? How can you be sure that your patient really understands what they have been told? How do you know, when they eventually consent to the treatment, that you did not influence them in some way, or that they are not just making a decision that they feel compelled, in some way, to make? Were they adequately informed when they consented to the treatment?

Lillie Lum is a PhD candidate at the Institute of Medical Sciences. With a background in Nursing, she is part of a special research-oriented program for health professionals. Informed consent is the general topic in which her research lies. Lum originally started looking at two major philosophical principles involved in dealing with medical patients: promoting autonomy in your patients (they should be doing what they desire to do) and beneficence (doing what is good for the patient). These two topics, she soon found, were too broad for a three-year research project. So she decided to develop an instrument that would measure the concept of autonomy based on the following question: "What kind of interaction do you need to have with a patient in order to meet the criteria for that patient's autonomy?" Lum's research involves cancer patients who must give consent in order to receive treatment. "There has been a fair amount of work done in patient decision making. But nobody's looked at it from a philosophical aspect. How do you know a patient is autonomous? A lot of patients say 'I did it because my doctor said I should,' or, 'my family wanted me to.' Is that acceptable from a legal and philosophical perspective?"

The movement towards looking at informed consent was stimulated in the 1950s, when patients were given treatment that was not entirely informed and, in some cases, highly unethical and, as a result, suffered permanent damage. You cannot give somebody, who is not truly aware of what they are getting into, treatment of any kind, especially cancer treatment where there are some serious side effects. Clinical drug trials are another area where the patient must understand the possible side effects of the drug being tested. All research protocols must go through a review committee; the bottom-line issue involved is that they must show that the patients are well informed before they consent.

Lum's instrument to measure autonomy took the form of a questionnaire. She started working with a pre-designed questionnaire developed for another study, but found it did not provide her with the information she needed for her study. So she designed a thirty-item questionnaire that could be answered in twenty minutes. "When you are dealing with a group of patients," Lum explains, "you can't spend two hours pumping them for information." The questions deal with values and views about cancer and treatment. Lum asked them questions about whether they received much information and how comfortable, or willing, they were to ask the doctors or nurses about their treatment. Her ultimate hypothesis was that if patients have values and views about cancer, and feel able to ask questions and comprehend the information they receive, then that constitutes a baseline measure for autonomy. She hopes that her research will help physicians and nurses gain insight into what is required to make patients better informed. This revolves around a general feeling that the well-informed patient is able to be more involved in his or her treatment and will find the whole process of illness and treatment less traumatic.

Right now, Lum is in the process of analysing her research data with the SAS statistical analysis package. She considers her work a quantitative analysis of a more qualitative question; in her program, the push is obviously towards creativity. As part of a Biostatistics course here at the university, she was introduced to SAS on a mainframe system. After learning the program by trial and error, she took an introductory SAS-PC course here at UTCS, and has been using this program for her data analysis ever since. She has high praise for Sandra Gardner of the SNAC group, who has helped her out of a few jams. "When I was just 24 hours away from my meeting with my committee to look at my thesis, I found that in the way that I had coded the data, I had missed out half of the values. Sandra picked that up. That was a close call. I had to re-analyze everything.

The people at UTCS are very knowledgeable. They know statistics and they know the computer, which you do not find all of the time because statisticians often know statistics, but not necessarily statistical packages. . . . Sandra is very experienced in handling data, even that with which she has had no previous contact. . . . I've been telling everybody how great the service is."

The Text/Imaging Support Group assists users in the following computer-related areas: text processing and manuscript preparation, desktop publishing, computer graphics and imaging, and electronic presentations.

Text/Imaging Support Group

The Text/Imaging Group provides the following services to the U of T community:

- answers questions about word processing, graphics, and desktop publishing software for the Mac and the PC, including specialized text applications such as bibliographic databases
- answers questions about personal computer output devices: mainly printers, but also unusual equipment such as typesetters or slide makers
- answers questions about computer-assisted presentation of instructional material; the group has experience with presentation software and hypermedia
- assists in the basic design and prepares prototypes for computer-assisted instructional material
- works with the University's *Centre for Computing in the Humanities* to develop software for use by various Humanities disciplines

Just ask us ...

Q: My word processor / desktop publishing program / printer isn't performing as I expected.

A: We may be able to explain why the feature works as it does, perhaps by identifying some aspect of the setup on your machine that might be causing problems. If you've found a bug, we can deal with the vendor to get assistance.

Q: I want to start some new operation, such as desktop publishing. What software and hardware do I need?

A: We will review your needs and expectations, and discuss your alternatives with you. We can also let you try out various machines and programs that we have available.

Q: I want to start using some feature of my software that I haven't used before.

A: We can introduce you to parts of your software that you currently don't use, and explain when and how you can put them to work for you. In some cases, UTCS short courses, such as Advanced WordPerfect, may best suit your needs.

Jennifer Taylor, OROC

Investing in People

How do you say Central Processing Unit in Chinese? "Central Processing Unit". The term is an English-only expression because of its recent (20th century) creation. Why would you need to express this concept in Chinese? Ask Harriet Ji, who taught an introductory course in computing and WordPerfect to a group of Mandarin Chinese.

Ji's students were taking part in a Human Development Training Program created by the Canadian International Development Agency (CIDA). They were professionals and academics from China who were here to gain firsthand experiences of our technological advances in their respective professions. This is based on the idea of developing the people of underdeveloped countries, so that they can help their countries develop themselves.

The Chinese workplace is very different from its Canadian counterpart. In order to prepare the Chinese "trainees" for these differences, as well as to protect them from a culture shock, three Regional Orientation Centres (ROC) across Canada organize four to six-week orientation programs. Jennifer Taylor, Program Assistant at the Ontario Region Orientation Centre (OROC) which is part of the University of Toronto-York University Joint Centre for Asia Pacific Studies, explains the importance of having a computer course as part of the orientation program, ". . . just about everybody needs to know computers, and if they don't have it [computer literacy] they have to work on getting over that initial stumbling block before they can get on with the rest of the training involved."

Ji found her pupils excited and eager to learn. Though she originally expected to teach the course in English, when her pupils discovered that she could speak Mandarin Chinese, they agreed that they would learn more in their native language. It was immediately obvious to Ji that her pupils knew almost nothing about computing. Looking out into a sea of blank, confused faces, she realized that she would have to start from the very basic history and development of computers and work her way up to the various types of software to prepare them to learn WordPerfect. Taylor had asked for ". . . just a general introduction, and a little bit of hands-on, practical experience." The entire session, for ten students, would be three hours.

Staying for almost an hour after their session was over, Ji says her pupils were "full of questions." It was an exciting experience teaching computing to her native Chinese. "You take a lot of things in this world for granted." Computer literacy is certainly one of those things.

The CIDA program is a continual program with the ROCs providing new orientation sessions about every six months. In August 1990, Ji taught two more full-day sessions, with nine pupils per session. The longer sessions were in response to the pupils expressing the desire for more time to learn about computers. Says Taylor, ". . . they got so much out of it. I think that the computer courses will become an integral part of our program now, because they are so essential."

Corinne-Hart Zeldon, Behavioural Science

What are you going to do about it?

1) *All of the swings and slides in your neighbourhood are broken.*
2) *Every time you go past this one house there's a mean dog; but it's the only way to go to school.*
3) *You are going to the community centre, but you can't cross the street because there aren't any traffic lights.*

Who would you get to help you? How would you get them to help you? What do you think they could do? Who else could you get to help you?

If these questions seem a bit juvenile, it is because they were designed to assess problem-solving skills in children. Current behavioural theory says that it is important to teach problem-solving skills to children because they will, hopefully, use them in later life. Corinne Hart-Zeldon is co-coordinator of a joint research project, between the Department of Behavioural Science here at the University of Toronto, and the Lawrence Heights Community Centre, to study community development and children. Community development involves getting people to define their (community's) own problems and to devise their own solutions as a community. "So you get people working together, instead of you going in and telling them what their problems are and how to solve them. In this way, if you think their problem is rampant drug use, and they think it's that they need gardens in their yards, you work on their problem first and let them develop the skills for solving the problem and in that way they own the solution," says Hart-Zeldon.

This community development project started about four years ago, when Hart-Zeldon was working on her Master of Health Sciences degree. Prior to this research project, she collaborated with Patti Pollack, Dr. Ilze Kalnins, and Dr. Rhonda Love on a paper concerning health promotion and children, which was a culmination of four separate papers. The logical follow up was a full research project into community development and children. Supervised by Dr. Kalnins, Hart-Zeldon and Pollock became the research coordinators, and have been working at this for one year now.

The subjects of their study are a class of grade four students from Lawrence Heights Elementary School and classes from two control schools. This group totals about 70 nine-year-olds, so collecting the data was a large task. The children were individually posed questions to measure their problem-solving abilities. Those from the control schools were asked questions at the beginning and the end of the study, and those from the main study school were taught problem-solving skills between both question periods. Their cumulative answers were taped, transcribed, and are now about to undergo qualitative analysis. Qualitative analysis differs from other types of data analysis in that it involves models and themes, not statistics. To perform this type of analysis, the research team will be using HyperQual, a qualitative analysis package for the Macintosh that is based on HyperCard. HyperQual will give the team a real advantage over manual qualitative analysis because it involves putting all of the information onto index cards which are pasted to bulletin boards, and then moved around as various matches in themes and ideas are found. This is a time-consuming process which involves a large amount of paperwork, and lots of writing and rewriting as ideas fit into new categories. The use of a computer program facilitates data access and, because of the computer's ability to recognize words and word strings, more themes and ideas will be found in the children's answers than would have been otherwise possible.

HyperQual itself presented a big challenge to the team because, though some of them were already familiar with the Macintosh, they all had to learn to use the program. Learning a new piece of software is a difficult task, especially when you are just learning to use the environment in which it is based. For Hart-Zeldon and the researchers, the best possible way would have been to have actually taken a course in HyperQual. The other drawback to brand-new software, though, is that very seldom are courses actually taught on it. So the next best thing is to take a course on similar software. This is where UTCS came in. Hart-Zeldon called the UTCS course Education Co-ordinator to see if we taught a course in HyperQual, and we suggested she try HyperCard because they were similar packages. Because of the particular needs of the group, a special course was set up. Geoffrey Rockwell, who taught the HyperCard course, reviewed HyperQual and helped the research team learn to use it by teaching them HyperCard. Nine people took the course, those who would be actually manipulating the data that they would put into HyperQual and those who just wanted to be able to view the data occasionally. "It was a wonderful course. . . . I was quite impressed because he [Geoffrey] tailored the course for us. He would talk for awhile, then ask if this was what we really needed [for the project]. . . . He made it less threatening. The bottom line is — the course eased everybody's level of stress, and that's what we needed."

A manual on community development for children and several research papers will be the product of this project. After its completion, Hart-Zeldon says, "We would like to do this again with more schools, and more children."

Ian Lancashire, Centre for Computing in the Humanities

"Speaking TACTfully"

In this office in New College there are two overflowing bookshelves, a table, desk, and phone. Glancing up at the shelves, your eye is caught by the section of software and programming manuals; and on the wall hangs a poster advertising the first conference for humanities computing held at the University of Toronto in 1989. It becomes apparent that a person who takes computing seriously works here. That person is Dr. Ian Lancashire.

A professor of English, Dr. Lancashire has worked hard to make technology available to his students and colleagues all over the world. "If you are in the Humanities, there's virtually nothing that can do basic analysis of texts," says Dr. Lancashire. There is now. A joint effort between the Text/Imaging Group at UTCS and Dr. Lancashire produced TACT, a text analysis and retrieval program for the PC.

The development of TACT began in 1985, when the department of English commissioned a report from UTCS on the possibility of such a program. John Bradley, of the Text/Imaging group, prepared a report which became the basic idea for the software. An IBM Canada cooperative in the Humanities, which began in 1986, provided necessary resources, such as equipment, for the project.

Dr. Lancashire acknowledges Bradley as the master designer of TACT, providing the necessary programming skills to create the software. "He developed the notion of a rule library which was, in effect, a set of commands that would automatically retrieve certain kinds of textual information. . . . There were other notions that he himself would not have inserted. . . collocation is a good example. That kind of addition to the program was an addition by the faculty. The academics provide the ideas, they test the program, they create the texts which are used by it, and they apply the program in teaching." A prototype of the program, written in Turbo Pascal, was developed in 1988, and Version 1.0 of TACT was issued in June of 1989 at The Dynamic Text, the conference mentioned earlier.

Other textbase management systems exist. They are commercial, provide commercial features, and have commercial prices. TACT is a major piece of software, serving an academic audience, and is available free-of-charge. After being out for only a year, TACT has been selected by an international body of Spanish scholars for a huge textbase of mediaeval Spanish materials to be issued as part of a quincentennial celebration. It is recognized worldwide.

What should also be recognized, Dr. Lancashire feels, is the uniqueness of the project itself. "The relationship between Text/Imaging and the Humanities is very unusual. I think that where you have a field that shows promise in developing software for instructional purposes and where you have faculty members who are willing and even eager to develop instructional and research software that can't be developed elsewhere, it would make sense for a service-oriented organization like UTCS to supply staff to do that kind of programming and allow the faculty members to do the pedagogical research, the thinking. That's what has happened here."

UTCS Staff Changes

Applications and Advising Support Group

Alex Nishri
nishri@utcs.utoronto.ca

A number of staff changes have occurred in the Advising and Applications Support group during the summer. Reinhard Schuller, Supervisor of Advising has left. Darius Dabek, formerly a Consultant within the group, has taken over the position. He can be reached at 978-6878.

Adam Iles, who was working for us as a Consultant part-time now works full-time for the Centre for Computing in the Humanities. He is replaced by Monica Ackermann, who has done consulting in providing access to computers for persons with physical disabilities. Her telephone number is 978-8823. Another Consultant, Rob Janes has left UTCS and has not yet been replaced.

Information Centre

Patricia Hood
phood@vm.utcs.utoronto.ca

Two important staff changes occurred within Information Services over the summer. Evelyn Ward has taken on the job of Information Office Assistant. Site license and manual requests should be addressed to her at 978-4990. George Katterloher has replaced Mary Wilson in the Microcomputer Lab. Mary has moved to Vancouver to tackle her Masters degree. For machine bookings, contact George at 978-5601.

Announcing...

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Organizational Changes Create New Departments

In mid-July, David Sadleir, VP-Computing and Communications, announced organizational changes for Business Information Systems and Information Systems Services. These changes reflect the need to provide new, effective services to a broader community within the University. No changes have been made yet within Computing Services or Voice Communications.

Starting with this issue, *ComputerNews* will present articles from all areas of Computing and Communications to keep you abreast of the changes and new directions within this division. Please welcome Mark Lippard, Deborah Stewart, and Eva Swenson to our group of contributors. Your comments are welcome as we continue to evolve in both content and design.

Patricia Hood
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Planning and Coordination, Computing & Communications

One of the organizational changes announced recently by Dr. C.D. Sadleir, Vice-President for Computing and Communications, was the creation of a Planning and Coordination Department, of which I have been appointed Director. The Planning and Coordination Department will focus on University-wide long-term strategic issues with respect to information technology. It will be responsible for producing analyses of external and internal trends and for developing appropriate policies and strategies. In the coming months, the primary task for the Planning and Coordination Department will be to develop a five-year strategic plan with respect to the utilization of information technology in support of the priorities of the University. A major part of this effort will consist of documenting the current status of information technology resources throughout the University. A second role for the Planning and Coordination Department will be to provide coordination within the Division of Computing and Communications with respect to such matters as work programs, standards, and human resource profiles.

An immediate task is to acquire staff for the Department. Advertisements for two Planning Analyst positions were posted within the University on August 24, 1990. I look forward to working with members of the University community on this ambitious assignment. I intend to keep *ComputerNews* readers informed of future developments and initiatives as they occur.

Comments, opinions, and inquiries may be directed to Eva Swenson at 978-5138, eswenson@vm.utcs.utoronto.ca, or Room 08D, Simcoe Hall.

New Undergraduate Computing Facilities

June 20, 1990

A gift valued at $1.4 million from Digital Equipment of Canada Ltd. will help the University of Toronto bring computers out of the laboratory and into undergraduate classrooms.

This fall, more than 3,000 students in five U of T departments will have access to state-of-the-art computer hardware and software donated by Digital. The company's gift consists of an extensive RISC/UNIX facilities including two DECsystem 5000 workstations, 23 DECstation 2100s, and 52 VT1000 X-Windows graphics terminals. The sharing of the use of the facilities at the two sites is via local area networks, each connected to the campus backbone network.

The installation of the equipment at the St. George campus marks the beginning of a three-year project to form a computing consortium for undergraduate students. The departments of Botany, Geography, Psychology, Statistics and Zoology are partners in the Computers in Quantitative and Empirical Science Teaching (C-QUEST) initiative.

The Digital donation is a major contribution to the U of T's efforts to raise funds for undergraduate education as part of the University's Breakthrough Campaign.

Systems Development, Computing & Communications

Mr. Mark Lippard, formerly Director of Information Systems Services (ISS), has been appointed Director, Systems Development, Division of Computing and Communications. This new group is made up of staff previously working primarily within Business Information Systems (BIS) and ISS. UTCC/SD, as the group will be called, will continue to fulfill all of the responsibilities of the former BIS and ISS groups. In addition, UTCC/SD will include a new unit to provide service for the analysis, design, and development of local office systems and a new unit to provide an increased focus on much needed "front-end" systems analysis capability.

The formation of this new group facilitates the achievement of a number of objectives, among which, the following are critical:

1. Improved ability to serve a broader base of customers across the University in all domains requiring professional systems analysis, development and implementation;
2. Optimal evolution and utilization of skills with attendant broader career opportunities for staff and decreased risk and increased flexibility for the University;
3. Achievement of greater commonality in technological and architectural directions as well as in related facilities and tools;
4. Improved "inter-operability" between "central" and "local" systems.

In the near future, Mr. Lippard will be contacting representatives of the customer base to more fully explain the changes.

Voice Communications, Computing & Communications

This is our first opportunity to introduce ourselves to the readers of *ComputerNews*.

To give you just a bit of history about the group, let me take you back to August 1989 when the Voice Communications department became a part of the Computing and Communications division at the University.

As our name suggests, we are responsible for all voice communications on the four U of T campuses. Voice Communications includes pagers, radios, cable TV, as well as telephone service. All campuses are serviced with CENTREX III from Bell Canada. Our line and station counts are as follows:

St. George	6800 lines	7500 stations
Erindale	550 lines	520 stations
Scarborough	550 lines	520 stations

In August 1990, the Downsview campus upgraded their existing service to CENTREX III with 160 lines and 155 stations.

Behind the tangle of twisted pair are a number of fine dedicated individuals. Natasha Hawley, Susan Davison, Deanna Otter and Margie McAuslan are the console operators responsible for handling all the calls coming through on our main telephone number, 978-2011. Communication Officers Theresa Falcioni and Alex Johnston look after the day-to-day administration of Voice Communications on all campuses. Clerical support is provided by Sandy Levere. The newest member of the group, Ann McLean, is the system administrator for the Integrated Voice Messaging Systems currently being installed at the Erindale, Scarborough and St. George campuses (that's right folks, voice mail is here!). This group is managed by me, Debbie Stewart.

In future issues, we hope to let you know more about your telephone service with tips on how to make the most of your voice communication systems. As well, we will be telling you about some new and exciting products and services coming to the University. In the meantime, if you have any questions or just want to know a little more about Voice Communications at the U of T, we can be reached at 978-4000.

Debbie Stewart

Microsoft Windows

Alex Nishri
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Microsoft Windows is a graphical user interface for the PC. If your PC runs Windows, you won't be facing a screen which confronts you with C\> and you won't type cryptic phrases like DIR B: or CD\PROJECT. Instead your screen will have images of windows, buttons, menus, and icons. To get your work done, you will point at objects you see on the screen and manipulate them. Sometimes you will grab a menu and point at something you want from it. You might push a button drawn on the screen, or drag an icon of a file folder from one place to another. What you see on the screen is called your desktop. Just as with the wooden kind, your computer desktop can be cluttered with several things you are working on at once, or neatly arranged, as you like.

Windows is the foundation for a graphical user interface (GUI). It contains the support for drawing objects on the screen and letting you manipulate them. But it is applications which in turn ask Windows to draw the objects, and do useful work when you manipulate the objects. As with a non-graphical user interface computer, you still need word processors, spreadsheets, compilers, and other software for your work. In order to properly support the graphical user interface, applications must be specifically written for use with Windows. (Such applications are called Windows applications.) Some examples are Aldus PageMaker, COREL DRAW, Microsoft Excel, Microsoft PowerPoint, Microsoft Word for Windows, and Samna Amí. Windows can also run applications like dBase IV, Lotus 1-2-3, Microsoft Word, and WordPerfect, which are not specifically written for use with Windows. When running such non-Windows applications, some of the advantages of using a graphical user interface are lost, but not all.

Graphical user interfaces aren't new. For years, many researchers on this campus have used the Macintosh computer because they find it both powerful and, with its graphical user interface, easy to use. Even GUIs for the PC aren't new. Microsoft Windows itself has been around for half a decade. During that time, however, Windows has never been in widespread use. There are many reasons for this, some of which we discussed in the July/August 1990 issue of *ComputerNews.* (See "Graphical User Interfaces on the PC.")

This past May 22, Microsoft introduced version 3.0 of Windows, spending a record US$10 million on hype and advertising. As the smoke clears, there are some indications that this time it might start to slowly catch on. Many of the prior faults of Windows appear to have been corrected and reviewers have tended to be positive. A number of hardware vendors have committed to selling their PCs with Microsoft Windows already installed on the hard disk. A number of software vendors have announced more of their research and development money will go towards Windows applications. For example, there have been reports that Aldus Corp., Lotus Development Corp., and Farallon Computing Inc. have done this. Even WordPerfect Corp., which previously was planning to delay release of its Windows version, is now expected to have a WordPerfect for Windows version ready before its version for OS/2.

What sort of machine do you need for Windows? Drawing objects on the screen and moving them fast enough when they are manipulated requires a sufficiently powerful personal computer. Thus you will need a personal computer with an Intel 286, 386, or 486 processor. Windows can be successfully installed on a personal computer with an 8088 or 8086 processor, but this is not recommended both because of speed and because many Windows applications use features only available on the 286 or higher. You will need at least 640 kilobytes (KB) of memory, although most people will need more. For a video graphics adaptor, CGA will work, but we feel the higher resolution provided by EGA, VGA, 8514/A, or Hercules Graphics should be recommended. Having clear images is important if you are going to manipulate objects on the screen with ease. Microsoft has made using a mouse optional, but we think most people will find it much easier with one. To install Windows, you will need 4.5 megabytes (MB) of free hard disk space on a 286-based computer, and 6.3MB on a 386 or 486 computer. Of course, if you want to get additional applications to use with Windows, you will need even more disk space. Windows itself is available at a suggested retail price of $179 in Canada, but there are discounts for multi-user licenses. If you have an earlier version of Windows, you can upgrade for $60.

Windows comes on seven 3.5 inch diskettes or five 5.25 inch high density floppies. Despite this, it is quite simple to install. You simply insert the first diskette and type "SETUP." These instructions are even written on the diskette itself.

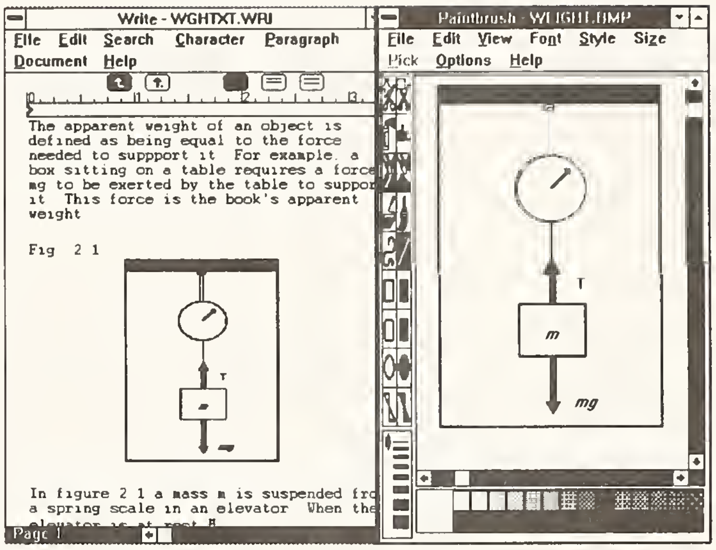
Computer Interfaces

An install program automatically determines what sort of computer you have, then asks you to insert the diskettes it needs to complete the installation. When it needs to change your AUTOEXEC.BAT and CONFIG.SYS files, it gives you the option of closely supervising and optionally rejecting the changes.

Once the install is complete you can immediately get down to work. Included free with Windows is a word processor, a painting application, a terminal emulator, a calculator, a booking calendar, and other applications. This is a sharp contrast to DOS, which comes with no useful applications included. Perhaps the first thing most people will try is the word processor, called **Write.** It is simple to use and includes features such as multiple font support, superscripts, subscripts, headers, footers, and hanging indents. In true graphical user interface spirit, tabs and margins are set by manipulating them on an onscreen ruler. Some features, like spell checking, are not present. (Microsoft would rather sell you Word for Windows, their more advanced word processor which is not included free.)

With Write still running in its own window, you might want to also run Paintbrush. (Terry Jones, our graphics specialist, has written a separate review of this application.) With both Write and Paintbrush running, your Windows desktop would resemble that of *Figure 1*. To move the picture into the document being prepared with Write, I copied it from the Paintbrush document to the Clipboard and then pasted it from the clipboard into the Write document. The use of a Clipboard to copy information between applications is an important part of most graphical user interfaces. Unfortunately, if you try to copy some text from the Write document to the Paintbrush document, you discover it can't be done. Whether because the Windows Clipboard is not yet standardized or because of an omission, this lack of consistency in Clipboard use is annoying.

Figure 1 shows Write and Paintbrush running.



The apparent weight of an object is
defined as being equal to the force
needed to suppport it For example a
box sitting on a table requires a force
mg to be exerted by the table to suppor
it This force is the book's apparent
weight

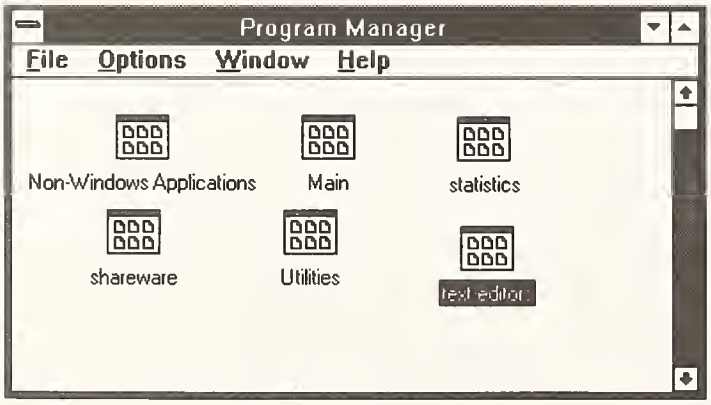
Fig 2 1

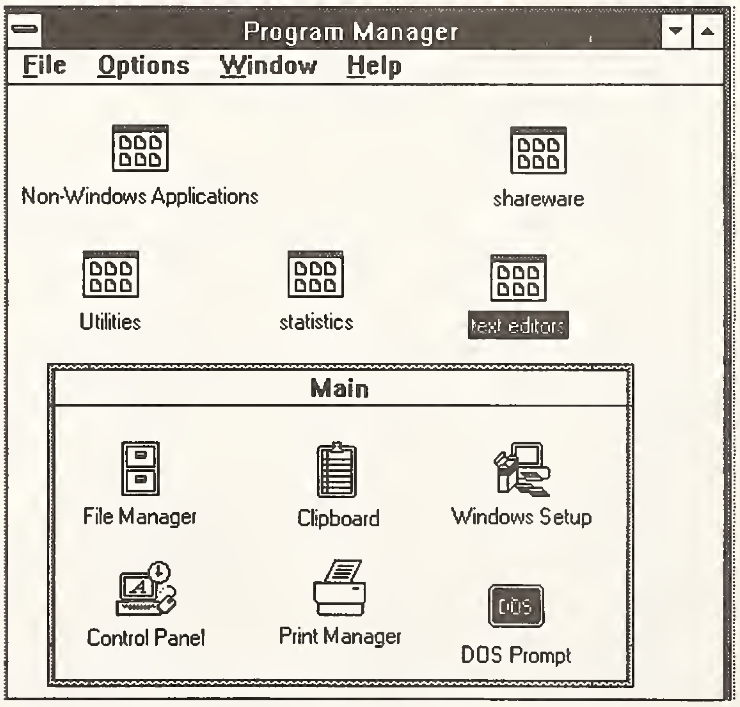
In figure 2 1 a mass m is suspended fro
a spring scale in an elevator When the

To start applications like Write, Paintbrush, or any other that you might have acquired, you will probably use the Program Manager window. This is a window which automatically appears whenever you start Microsoft Windows. Applications are arranged in groups, which you can change around to suit your taste. When you open a group to look inside, you find icons representing applications. These can then be "pointed at" to start the ones you want running. Both Windows and non-Windows applications can be started this way (see *Figure 2*).

To stop an application you can use the Exit option found in that

Figure 2 shows the Program Manager with the program groups, and then with the main group open.





application's File menu as illustrated in *Figure 3*. However, some applications have Exit under a different menu; for example, the included Windows Setup application has it under the Options menu. Some applications have no Exit at all, in which case, the Close option in the Control menu is used. Non-windows applications have no Exit or Close. This lack of consistency, particularly among Windows applications, can be confusing.

To organize your files and directories on your hard disk or floppy diskettes, the included Windows File Manager is used as in *Figure 4*. Directories are presented as icons that look like folders, while files appear as little documents. You can copy or move files and directories by simply dragging around the icons on the screen. Either can be removed by pointing at it and selecting a Delete option from a menu. If you select a file, Windows will try to run the corresponding application. For example, if you select a file called PROJECT.DOC, then, based on the three letter extension, the Write application might be started. Despite the nice interface that the File Manager provides, it cannot overcome the limitations of DOS files. Filenames are all upper case, with an eight character limitation on the first part, a period, and then a three letter extension. There are also times when the File Manager can be confusing; for example, when I tried to copy a file to a nonexistent directory, Windows said "STOP cannot replace C: \WORK\ARTICLE: cannot find path; check to ensure the path is correct". Finally, because Windows is not integrated with DOS, the File Manager has to go through all directories each time it is invoked, finding all files, a potentially time-consuming operation.

For those who want alternatives to the included File Manager and Program Manager, there are a number of vendors with shells and file utilities. For example, Publishing Technologies Inc.'s Pubtech File Organizer, known as CBM Desktop Office in the US, provides a desktop that looks more like that of the Macintosh, including the trash can for throwing things away. We are expecting an evaluation copy of this product shortly.

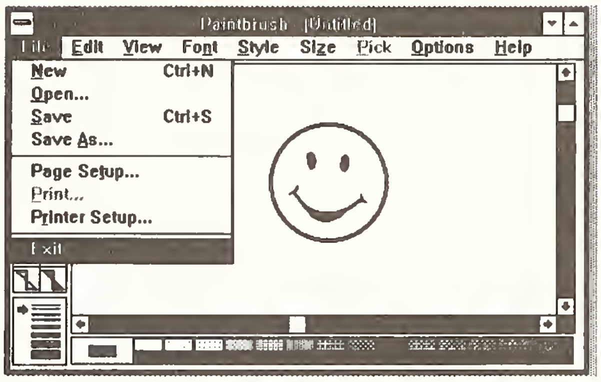


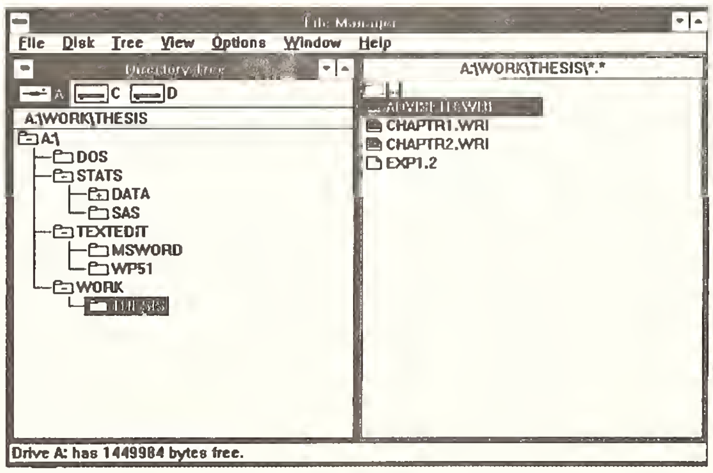
Figure 3 shows the exit option.

Starting in 1987, Apple bundled in an application called HyperCard with every Macintosh it sold. HyperCard is a development package for the graphical Macintosh world, much like BASIC was used for the textual Apple II and the IBM PC computers. Without a doubt, HyperCard was a real success in showing off the Macintosh, particularly in universities such as ours where various educational tools have been built with it. For those building tools with HyperCard, its graphical style of development process is often viewed as being much easier than using a traditional programming language such as C or BASIC.

It was clear that if Windows was to succeed it needed a tool like HyperCard. A number of companies are either working on such a tool, or have already released one, but one of these, Asymetrix Corp's ToolBook is included with versions of Windows sold directly by Microsoft. (Versions of Windows sold by other companies may not include it.) Where HyperCard uses a metaphor of stacks of cards, ToolBook uses pages in books. And like HyperCard, menus, buttons, and simple animation are supported. One big difference is that the version of ToolBook bundled with Windows does not permit you to develop anything new, only to run applications previously developed. If you want to use ToolBook to develop you need to buy a full version of ToolBook for US$395. Although we saw a demo of development using ToolBook at the Microsoft's unveiling of Windows 3.0, we have not had a chance to obtain a copy for evaluation. For those interested, a product has been announced which is supposed to be able to convert HyperCard stacks into ToolBook books.

Thus far we have discussed the advantages of the graphical user interface that Microsoft Windows provides. But there are other functions that Windows provides that can be useful. The ability to use more than 640KB of installed memory is one such function. (For more planning information, please

Figure 4 illustrates the Windows File Manager.



Drive A: has 1449984 bytes free.

see the sidebar on memory.) Another feature, already described, is that you can have more than one application started at one time, unlike DOS where to start a new application you have to leave the current one. Each application has its own window on the screen, and only one window is the active one, meaning it gets any keyboard input, so there is no confusion. Actually, Windows goes a step further, and more than one application can be doing work on your behalf concurrently. For example, using the provided Terminal application, reviewed in a separate article, you could be sending a file to a colleague's personal computer, while at the same time you could be using the Write application to prepare a document. This feature is called multitasking. Microsoft has stated that the multitasking done by Windows isn't "real multitasking" like that done in OS/2. Information about what kind of multitasking Windows does is difficult to get from Microsoft. However, for using Terminal to do a file transfer while you continue using Write, the multitasking is sufficient. If you are interested in the technical details and implications, the accompanying sidebar provides more information.

Another advantage that Windows offers is device-independence for applications. Under DOS, applications displaying more than rudimentary text on the screen must support the particular video graphics card in your personal computer. Windows applications on the other hand, don't need to know if you have CGA, EGA, VGA, Hercules Graphics or another kind of video card. Instead they use the Graphics Device Interface (GDI). Windows interprets GDI and provides drivers for most popular video cards. Printing is also supported in this way, with Windows applications using GDI, and Windows providing drivers for most popular printer types. Vendors of new video cards or printers will only have to provide a Windows device driver to support all Windows applications.

Windows applications that put text on the screen or printer, use the Windows font support. Instead of installing fonts in particular applications, fonts are installed in Microsoft Windows itself, where they are available for all Windows applications to use. Courier, Helv, Modern, Roman, Script, Symbol, and Tms Roman are automatically installed with windows. Additional fonts can be purchased depending on your needs. Some fonts are available only in certain sizes, whereas others, called vector fonts in Windows terminology, can be scaled to any size. Improvements in the way fonts are handled, by including Apple's True Font technology, are expected in the next release of Microsoft Windows sometime next summer.

Another feature of Microsoft Windows is Dynamic Data Exchange (DDE). DDE is a way that two applications running under Windows can exchange data. For example,

Memory: DOS versus Microsoft Windows 3.0

Personal Computers based on the 8088 and 8086 chip, such as the original IBM PC, are limited to 640KB of memory, sometimes called Random Access Memory (RAM). Actually, the 8088/8086 is capable of accessing up to 1MB of memory, but when IBM designed the original IBM PC, it reserved memory from 640KB to 1MB for video and other cards to use.

Where more than 640KB is sometimes required, expanded memory is used. Special expanded memory boards are used, and applications must be specifically designed to use the Lotus-Intel-Microsoft Expanded Memory Specification (LIM EMS). Such applications get access to a small chunks of data in expanded memory although they can change the chunk they currently have access to. Because expanded memory cannot all be directly accessed, it is usually much slower than conventional memory. Applications like SAS and WordPerfect support expanded memory.

When a 286 processor is first powered up, it acts just like an 8088 or 8086, memory restrictions and all. This Real Mode, as it is called, allows 286-based personal computers to run software designed for the 8088 or 8086. An operating system can switch the 286 into Protected Mode, where there is a number of additional features. In Protected Mode, the processor can logically partition memory so that rings of protection can be built around pieces of program code or data. Instead of the 640KB limit, up to 16MB of memory can be accessed. Memory accessed in Protected Mode is sometimes referred to as extended memory or as XMS memory. Since all of extended memory can be directly accessed, it is just as fast as conventional memory.

The 386 processor supports Real Mode and Protected Mode. However, a 386 running in Protected Mode can optionally address memory with numbers 32 bits wide. Thus it can directly access up to 4096MB or 4 gigabytes (GB) of memory. In addition, the 386 has hardware support for virtual memory, which means that if the operating system supports it, an application can appear to have more memory than is physically in the computer. Besides Real and Protected Mode, the 386 also has a Virtual 8086 mode. Using this feature, one or more 8088 or 8086 computers can be emulated inside the 386. These emulated machines are sometimes called "virtual machines." The emulation includes the 640KB address limit, but the memory used can be transparently mapped onto extended memory.

DOS only runs in real mode, no matter what processor your personal computer has. Since it never uses any feature more advanced than those available on the original 8088/8086 processors, DOS, and applications DOS runs, are limited to 640KB of addressable memory. Of course, DOS itself takes up some memory. If you actually have the maximum 640KB installed on your when a spreadsheet is updated, it might automatically update the corresponding chart you have in the word-processing document. Unlike the clipboard metaphor, you don't have to copy and paste the chart each time it is updated. Obviously the type of data which can be exchanged via DDE is dependent on how well the applications understand each other. This requires more cooperation from different vendors and more standards for the protocols used. One day you may be able to combine multiple Windows applications into a unified application customized for your needs. For now, however, only some applications support DDE, and those that do, do so only in simplified ways.

Some of the ideas necessary to extend DDE standards to what Microsoft calls "linked and embedded documents" are already present in another product, Hewlett-Packard's **NewWave.** NewWave is sometimes mistaken for a GUI, but is actually built on top of Microsoft Windows. Using the support that Microsoft Windows provides for windowing, graphics, fonts, multitasking, memory, and DDE, NewWave provides increased ease of use by concealing the DOS file system, providing a more iconic way of doing things, and with compound documents. Compound documents allow you to copy and paste from one application, such as a spread-

personal computer and are running DOS version 4.01, you have about 500KB of memory left over to run applications. Although DOS won't use it, some applications, such as the aforementioned SAS and WordPerfect, support the slow and cumbersome expanded memory as a way out of the 640KB bind.

When Microsoft Windows runs on an 8088 or 8086 processor, it too is limited to 640KB of installed memory. In fact, Microsoft Windows is so big itself that with only 640KB there is not a lot of room left over. If you have expanded memory, it doesn't help much. Windows uses expanded memory, but only to store started and suspended applications which would otherwise be swapped to disk.

If you run Microsoft Windows on a 286-based personal computer with at least 1MB of memory, it will run in Protected Mode to access the extended memory. Windows applications also use this memory. Thus the more memory (up to 16MB) you have on your personal computer, the bigger the Windows applications you can run, and the more started Windows applications you can have. Installing 16MB is probably excessive for most people, but 2 to 5MB might be reasonable depending on your requirements. Unfortunately, the 286 features that permit setting up rings of protection around applications are not used by Windows. For example, we ran some poorly-written Windows applications we obtained free of charge and Windows with all its started applications crashed. In contrast, OS/2 would have terminated the offending program without crashing.

When you run non-Windows applications on a 286 processor, Windows temporarily switches from Protected Mode to Real Mode. It must do this because most non-Windows applications were written for Real Mode and will not work properly in Protected Mode. While in Real Mode, only 640KB of memory is addressable. Unfortunately whereas running DOS version 4.01 on a personal computer equipped with 640KB leaves about 500KB for applications, Windows leaves only about 450KB for its non-Windows applications. This may mean that an application which just fit into available memory under DOS may not work under Microsoft Windows.

On a 386-based personal computer, Windows, and Windows applications, run in Protected Mode exactly as on a 286-based personal computer. Windows does not use 386's capability of accessing up to 4 gigabytes (GB) of memory and so the restriction remains 16MB as on the 286. If your 386 personal computer has at least 2MB of memory, then the Virtual 8086 feature is used to run all non-Windows applications. Although non-Windows applications running in virtual machines are still limited to 640KB, their memory is mapped to the extended memory. This means that multiple non-Windows applications can be concurrently running, each program satisfied that it has the first 640KB of memory. Windows can also provide non-Windows applications with extended memory or emulated expanded memory. Also the virtual memory support of the 386 is used for both Windows and non-Windows applications; by swapping to disk programs and data not actively needed by Windows, it can be made to appear as though you have more memory than is physically available in your machine.

Windows Memory Restrictions Depend on Application Type and PC Type

Type of PC	Windows Applications	Non-Windows (DOS) Applications
8088/8086	640KB[1]	640KB[1]
286	16MB	640KB[1]
386	16MB[2]	640KB[1]

[1] With 640KB of memory installed, PC-DOS and Windows only leave about 450KB for applications

[2] Does not use capability of 386 to access up to 4GB of memory.

sheet, into your word processing application and have the pasted spreadsheet continue to be updated. This is better than hot-links because you never have to return to the original spreadsheet--you can redo calculations on the pasted spreadsheet in your word processing document! In this compound document, the spreadsheet package becomes a tool which is accessible from your word processor. Similarly, you might have a paint tool for drawing diagrams. Tools can be mixed and matched to form a cohesive environment, even if they come from different vendors. Another powerful part of NewWave is the Agent. Agent can record tasks involving several applications and run them automatically at preset times or conditions. For example, an Agent script might automatically phone several computers to collect some data, pass the data to a spreadsheet, and update the resulting graphs in a report.

NewWave tools must be specifically written for the NewWave environment. To date there is only a handful of tools available. This is one reason why, although NewWave has generated a lot of interest among those researching GUIs and their future, it is not widely used. The version of NewWave intended to work with Microsoft Windows version 3.0 is expected to be available in August. We intend to get an evaluation version.

Since no graphical user interface for the PC has yet obtained dominance, including Microsoft Windows, we would be remiss in not mentioning the competition. Some members of this University have been using Digital Research Inc.'s (DRI) **Graphical Environment Manager** (GEM). The only significant GEM application is Xerox's Ventura Publisher, a desktop publishing application. In fact, most people who use GEM only run it when they want to use Ventura Publisher, and are unaware of GEM's facilities such as a very Macintosh-like Desktop. Ventura Publisher's role in promoting GEM may be diminished by third quarter, however, when versions for the Macintosh, OS/2, and Windows are expected. In fact, the Windows version of Ventura Publisher is expected to have features which were not possible to implement under GEM.

Another rival to Microsoft Windows

Multitasking with Microsoft Windows 3.0

Under Windows 3.0, the method of multitasking varies depending on whether the application is written for Windows and on the type of personal computer you are using. When an application written for Windows is running, it asks Windows a few times a second for messages. Messages tell applications when a keyboard key is pressed, when windows are to be closed, when items are selected, and so on. When multiple Windows applications are invoked, Windows runs them one at a time. As each application asks for messages, Windows temporarily stops it. Then it decides which application next deserves to run for a while, fixes up the environment, and allows that application to run. This new application runs until it next asks for messages. This is called non-preemptive multitasking because Windows never interrupts or "preempts" a running application. In order for non-preemptive multitasking to be successful, all running applications need to be "well-behaved," with each doing very little processing before asking Windows for messages. One Windows application we found on a public file server took a long time to draw complex graphics before asking for messages, and, sure enough, it was impossible to run it and use another application at the same time. Another implication is that Windows doesn't have much control over the relative amounts of processor time each application gets. (This method of multitasking is also used by Apple's Macintosh MultiFinder, where applications ask for "events" instead of "messages.") Because an operating system, such as Windows, can't rein-in an application that takes an unfair share of processor time when it doesn't ask for messages often enough, some people, especially those with more expensive operating systems to sell, sometimes say this isn't "real" multitasking.

The situation is more complex for non-Windows applications running under Microsoft Windows. On an 8088, 8086, or 286 processor when a non-Windows application is to be run, all other Windows and non-Windows applications are suspended. Anything occupying the first 640KB of memory is either written to disk or moved to higher memory, if available. The non-Windows application to be run is then put in the first 640KB of memory, along with a small piece of Windows which traps and implements the hotkey which brings Windows back. The result is that non-Windows applications take over the whole screen instead of appearing in a window, there is no multitasking going on while they are active, and they are not multitasked while any other application is active. As well, every time you activate and deactivate a non-Windows application you will notice a significant delay. These restrictions are very similar to those found in OS/2. However, unlike OS/2, which restricts you to running only one application in its DOS box, you can have more than one non-Windows application started at one time.

On a 386 or 486 processor, Windows uses the Virtual 8086 Mode of the processor chip. Microsoft Windows runs each non-Windows application in a separate virtual machine. The virtual machines are preemptively multitasked. Preemptive means that Microsoft Windows can interrupt a non-Windows application the instant it determines it has

has been Quarterdeck Office Systems **Desqview.** Although Desqview is not a graphical user interface, it does offer multitasking and relief of some memory limitations. For example, some researchers who do FORTRAN number crunching on their 386 PCs have told us they find Desqview useful. Quarterdeck has announced that by the end of this year they intend to have a version of Desqview which supports X Window. X Window is a protocol which permits programs to access windows, a mouse, and a keyboard through a network. Used by many University departments with computers which run UNIX, those departments may be interested in the Desqview/X product. Although there are other X Window implementations for the PC, such as Hummingbird Communications Ltd.'s **HCL Exceed** or Locus Computing's **PC-Xsight,** Desqview is unique in that it uses its multitasking capability to offer the ability to have windows on the screen which belong to remotely executing programs at the same time as there are windows belonging to PC-DOS applications running locally. How Desqview will fare in the long term with this strategy is not clear.

Perhaps the most talked about competitor to Microsoft Windows is IBM and Microsoft's OS/2. Microsoft intentionally designed Windows to look similar to OS/2, when the latter is running its included Presentation Manager. On the other hand, OS/2 is a more expensive, bigger system, requiring more system resources and providing some features that Windows doesn't have. IBM has been pushing OS/2 as the way of the future, even as Microsoft seems to have alternated between giving media attention to the jointly developed OS/2 and the exclusively developed Windows. With all the confusion about OS/2 versus Windows, IBM and Microsoft tried to explain the differences at last fall's Comdex, a large industry trade show for dealers. They recommended that Windows be used for low-end PCs with 2MB of memory or less and OS/2 be used with 4MB or more. Microsoft also promised not to add to Windows several of OS/2's more advanced features such as multithreading, support for long filenames, and better file performance. Although better performance is certainly desirable, we found that

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had enough processor time; there is nothing a program can do to take more than its fair share. All this can be happening concurrently with Windows applications being non-preemptively multitasked. To test this, we started a number crunching non-Windows application while we were working on a document with Write, with excellent results. Even with multiple non-Windows applications number crunching concurrently, Write continued to be quite usable. We also successfully ran compilers and ProComm in this way. Also, because the virtual machine is being used, non-Windows applications can optionally be running in windows instead of taking over the screen. You can even have one or more windows with the C\> prompt if you miss DOS. When activating and deactivating applications, there is no perceivable delay. In comparison, OS/2 doesn't use the virtual machine feature of the 386 and 486 processors, and so has none of these advantages. The only problem with running non-Windows applications in a window is that the video graphics have to be simulated and hence some applications appear to run slower. Non-Windows applications using the graphics mode of video memory are suspended when they are not active, for the same reason.

In summary, Windows applications are always non-preemptively multitasked among themselves. On 8088,8086, and 286 machines, non-Windows applications are exclusive and take over the machine for themselves. On 386 and 486 machines, non-Windows applications are preemptively multitasked.

Windows Multitasking by Application and Machine Type

Type of Machine	Windows Applications	Non-Windows (DOS) Applications
8088/8086	non-preemptive	no multitasking
286	non-preemptive	no multitasking
386	non-preemptive	preemptive

Application Screen Effect

Type of Machine	Windows Applications	Non-Windows (DOS) Applications
8088/8086	appears in window	not in window, takes over screen
286	appears in window	not in window, takes over screen
386	appears in window	user choice: appears in window or takes over screen

you may still want to run Microsoft Windows on a machine such as a 386-based machine with 4MB of memory or more. Factors in Windows' favour include cost, easier installation, and an improved ability to run non-Windows applications as explained in the sidebars on memory and multitasking.

Currently, applications designed to work with Microsoft Windows will not work with OS/2, or vice versa. However, in the future Microsoft is expected to offer a tool that will permit application developers who stick to a subset of features common to both systems, to easily migrate their applications between the two systems. This will be attractive to software vendors, all of whom find it more expensive to develop applications for multiple systems. Since OS/2 is the functionally richer system, applications written for both systems, using a migration tool, are not likely to exploit its potential. However, if buyers are faced with getting the same functionality from their applications under OS/2 and Windows, they may opt for the cheaper Windows.

In the long term, it is difficult to predict the future of OS/2 versus Windows. Obviously, if enough popular applications emerge which exploit functions only available in OS/2, then OS/2 will be widely used. In the short term, however, it would appear that Windows will be more widely used, particularly in universities. OS/2 is likely to be used in smaller numbers, where specific high-end applications exist.

Of course, far more popular than Microsoft Windows or any of the mentioned alternatives is IBM PC-DOS, alias Microsoft MS-DOS. Without a graphical user interface for applications or any other of Microsoft Window's advantages, PC-DOS is used on such overwhelming numbers of personal computers, that its dominance is not going to be challenged overnight. In fact, PCs around the University of Toronto are probably still 8088 or 8086 processor-based, and these will not be suitable for running Windows. Other people run only one application on their personal computer, usually a word processor, and may be quite satisfied without changing to a graphical user interface. However, we think that over time, the number of people using Microsoft Windows at this university will grow. A new version of SAS expected in first quarter next year, will mean that our PC SAS users will have to choose between running it under OS/2 or Windows, with no DOS alternative. Other packages may only offer enhanced features when running under Windows. We also expect that many people will find a graphical user interface, such as provided by Microsoft Windows, easier to learn and use.

In the final analysis, no operating system can be successful based only on its technical merits. What is necessary are software application packages which buyers find useful. If Windows applications emerge which meet user requirements and are not available with DOS, then Windows has a chance of being successful.

If you are interested in seeing Microsoft Windows or have any questions, please phone 978-HELP.

Microsoft Windows 3.0's Problems

We have been evaluating Windows version 3.0 since Microsoft provided us with copies at the announcement seminar on May 22. Overall, we have found few bugs. If you use applications designed for earlier versions of Windows, then a warning appears, and occasionally the system crashes. The remedy while you wait to upgrade such applications is to run Windows in Real mode, where 286 and 386 processor features are not used, and where multitasking and memory limitations are poorer.

There were press reports that Windows 3.0 "trashes hard drives" formatted with DOS 4.0. Because we were using DOS 4.0, we were concerned, but the reports turned out to be false. Instead, the problem exists only if you are using disks larger than 32MB and have a version of DOS earlier than version 4.0. Those versions of DOS didn't support such disks, and special third party software was used to extend DOS. Windows is not necessarily compatible with these third party extenders.

Terry Jones ran into another problem when he installed something on his personal computer which used extended memory. Programs, like Windows, which use extended memory, use a file called HIMEM.SYS to manage it. Somehow the package Terry installed replaced the HIMEM.SYS file with an earlier version. Terry only noticed the problem when Windows appeared to him to be slower. We suggest that you take steps to protect the HIMEM.SYS file, normally installed in your root directory, so that it cannot be tampered with.

Although we had no problem installing Windows using the 3.5 inch diskette version, when we tried using a copy that came on 5.25 inch high-density floppies, two of the floppies became corrupted during the install process. Microsoft informs us this has happened to others and is investigating the problem. We recommend always write-protecting floppies containing your original copy of software before using them.

Even though we have used Windows version 3.0 for a few weeks, our experience is limited by the fact we have few applications designed for this version. We have applications for an older version of Windows, but Windows has changed quite a bit. We have also not extensively tested how Windows handles printers, and we haven't even looked at some new features permitting easier access to a local area network. If you are using Windows and have comments or problems, we would be interested in hearing from you through Advising at 978-HELP.

Microsoft Windows' Effect on the Apple Macintosh

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At the University of Toronto, there is a large community which uses the Apple Macintosh. What does the announcement of Windows 3.0 on the PC mean for the Macintosh?

I'm sure Macintosh users will want to compare the user interfaces. There are certainly many similarities, and if you have used a Macintosh you should be able to figure out Windows in very little time. Most people find Windows offers a less consistent and less easy-to-use interface. This is partly due to the fact that Windows has to support more hardware types without Microsoft being able to set standards. Different video graphics boards and different printers make it more difficult for the software to be consistent. In the user manual provided with Windows, large sections are devoted to how the user interface changes substantially when Windows runs on a 8088 versus 286 versus 386 processors. Things are also less intuitive because Windows is built on top of DOS and the DOS file system, both inferior in features to the Mac operating system. Some of the inconsistency appears to be lack of attention to detail; Macintosh users know that the first pull-down menu is called File and the last item in that menu is Quit in every application. We found Exit, the direct equivalent in Windows, under a File menu, an Options menu, and a Game menu in three of the applications supplied by Microsoft with Windows. Also, Microsoft doesn't seem to have as complete a mental model for users of Windows as Apple has for the Macintosh; for example, although Microsoft and Apple both call what is on the screen a desktop, Windows doesn't follow the metaphor by permitting file folders and documents to be placed on the desktop the way a Macintosh does.

To users of the Macintosh, however, the importance of Microsoft's new Windows is that it increases competition. There has always been a perception that Macintoshes cost more than IBM PC clones. Now with some, even if not all, of the Macintosh advantage available on PC clones with Windows, Apple is responding with price cuts. Apple has promised to cut its margins, to cut prices on current models, and to deliver new low-cost machines over the course of the next year. This is good news for Macintosh users.

The other effect of Microsoft's announcement may be on software products. Software vendors find it too expensive to develop applications for many operating systems at once. We can speculate that as some vendors increase research and development budgets for Windows and OS/2 applications, they may also spend less on their Macintosh applications. Even exclusively Macintosh vendors might be tempted to use their expertise in graphical user interfaces for developing products for Windows. One such vendor, MacroMind Inc, of **Director** fame, has announced it will be porting its multimedia tools to Windows. If Windows does affect research and development budgets for Macintosh applications, this would be bad news for Macintosh users. On the other hand, today there are far more mature applications for the Macintosh than for Windows.

One company that may have been tempted to port its exclusively-Macintosh products to Windows is Claris Corp. Claris was a spinoff of Apple itself, and owner of former Apple applications like MacWrite, MacPaint, and FileMaker. In the wake of the Microsoft Windows announcement, Apple bought Claris back. When Apple spun Claris off three years ago, it signalled that Apple considered itself a platform company, concentrating on the Macintosh hardware, operating system, and enabling technology. With Claris back in the fold, Apple appears to be back in the business of applications. Perhaps Apple saw the competition and it was Microsoft, not IBM.

Windows Paintbrush

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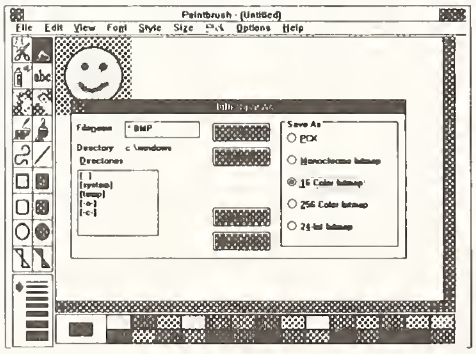
As with previous versions of Windows, Windows 3.0 provides a number of simple applications. **Paintbrush,** one such application, shows quite an improvement over earlier versions. Use of colour, better import and export capabilities, more image options, and colour printing are some of the new features.

You can use the new version of Paintbrush to create a custom wallpaper for your Windows 3.0 "desktop." (This is comparable to the desktop pattern you can set on the Macintosh.) To illustrate this, I created a happy face. Using Paintbrush's EDIT and COPY TO commands, I saved the happy face in a bitmap (BMP) file called HAPPY.BMP in the Windows directory. Then I used the Control Panel Desktop icon to choose my wallpaper. I selected HAPPY and the TILE option, and was presented with a background that is, well, a little less businesslike than the standard grey!

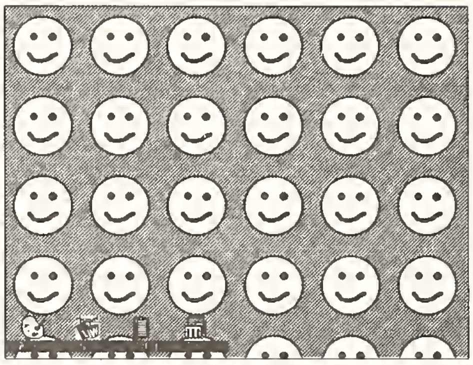
Paintbrush's import and export functions have been improved. The new version can open and save more than one type of "paint" file. PC Paintbrush files (PCX), old Microsoft Paint files (MSP), and the new bitmap files (BMP) can all be opened in PaintBrush by using the FILE, OPEN command sequence. You can save pictures created with Paintbrush as both bitmap and PC Paintbrush files.

Happy face created in Paintbrush is saved as a BMP file.



Filename: *.BMP

Directory: c:\windows



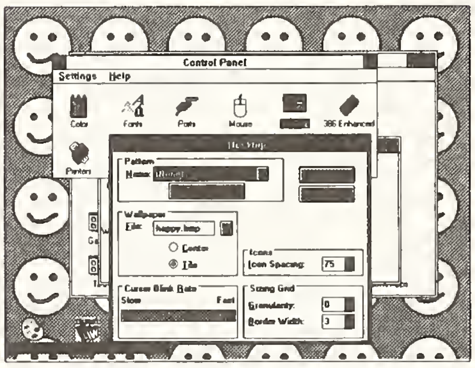
Happy face is tiled.

You can also save yourself a bit of time by learning Paintbrush's keyboard shortcuts. Where they exist, key combinations for keyboard shortcuts are listed by the menu item on the pull-down menu.

Vivid colours are available in the new Paintbrush, but colour printing is limited. Colour printing directly from Paintbrush is supported by only a few printers, such as colour PostScript printers and the HP PaintJet. The drivers provided with Windows 3.0 do not permit colour printing on inexpensive colour dot matrix printers.

While I was using the new Paintbrush, I learned a few tricks. The first concerns the UNDO function. If you are not careful, UNDO eliminates everything you have created with the currently-selected tool. Perhaps you are making a number of circles. If you make a mistake and use UNDO, then *all* the circles you have made since you first selected the circle tool will disappear. You should re-select the circle tool after each "good" circle to avoid losing all your work. (Actually, you can reselect the tool at any point, but to safeguard your work, it is recommended that you reselect the tool whenever you are satisfied with what you have created.)

If you paste a graphic from the clipboard into Paintbrush, the pasted picture will be cropped to the size of the viewable are, i.e., whatever won't fit gets chopped off at the edges. If the picture you want to paste into Paintbrush is larger than the normal window, then ZOOM OUT first, PASTE and set the picture, then ZOOM IN again.



File: happy.bmp

Icon Spacing: 75

Granularity: 0

Border Width: 3

Happy face is used as wallpaper and tiled.

If you want to create a picture that has a coloured background, select the background colour you want (use the right mouse button to do this), and then use FILE NEW.

In conclusion, Paintbrush is much more pleasurable to work with than the earlier versions of the program, and it was a nice bonus to find it bundled free-of-charge with Windows 3.

The Windows 3.0 Terminal Program

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Windows Terminal is the terminal-to-host communications package provided with Windows 3.0. It appeared to be fundamentally the same program as the version that was distributed with the previous release of Windows. In our brief review, we compared it to ProComm version 2.4.2UT, the version that is licensed for use by University of Toronto computer users. Using a Commodore PC 50-II AT computer running MS-DOS version 4.01, we connected to the UTCS host services: VM/CMS and General Purpose UNIX (GPUNIX). Windows Terminal was compared to ProComm in terminal keyboard emulation and file transfers at 2400 bits per second (bps).

The biggest problem we encountered was in getting the function keys and arrow keys (the keys that move the cursor around on the screen) to work as documented – we eventually discovered (by perusing the Windows 3.0 User's Guide) that only the first four function keys were supported. Using it with our VM/CMS service was particularly inconvenient, because so many things are done with function keys. By comparison, ProComm supported all of the function keys. At first we thought Windows Terminal didn't support arrow keys as well, but then we discovered that the keyboard's "scroll lock" must be switched on for the arrow keys to work.

Windows Terminal has only three terminal emulations that it can perform: TTY (Generic), DEC VT100 (ANSI), and DEC VT52. Both the VT100 and VT52 worked fine when used with a full-screen application (the XEDIT editor on VM/CMS), with the exception that only the first few function keys were defined (as noted above). Other users of the program had reported that Terminal tended to handle long lines (ones longer than 80 characters) badly so that, in some cases, it would insert a blank line between lines every time it wrapped a long line onto the next line. I experienced this problem intermittently when connected with Windows Terminal to the GPUNIX service running the "vi" full-screen text editor.

There were reports that Windows Terminal was noticeably slower than many other programs in performing file uploads and downloads. In comparing a 110 kilobyte (KB) binary file upload to VM/CMS using the Kermit file transfer protocol, and the same file downloaded from GPUNIX using XMODEM, Windows Terminal took only slightly longer (less than 60 seconds in 17 minutes) than ProComm 2.4.2UT running under Windows 3.0, at 2400 bps. Windows Terminal didn't have the ability to do text transfers, as opposed to the aforementioned binary transfers, using Kermit or XMODEM, but a straight text file download (without any protocol) from GPUNIX gave similar time results.

Then came the fun part. Unlike ProComm, Windows Terminal is a full Windows application. Because it supports the "inter-application" services that Windows provides, it had the capability of cutting and pasting text from another application. For example, I wrote a letter in Write (a word-processing application provided with Windows 3.0) and made a copy of it by selecting the text in the window (dragging the mouse cursor over it), choosing "Copy" from the "Edit" menu, clicking in the Terminal session window, and choosing "Paste" from the "edit" menu. My letter was ready to send as electronic mail! I found this to be one of the best features of the Windows Terminal program. Using ProComm this is also possible, but pasting into a DOS non-Windows application is slightly trickier because there is no Paste menu option.

Overall, the Windows Terminal program performed adequately, and only lost out in comparison to ProComm on a few features. For a microcomputer user at U of T, the 2.4.2UT version of ProComm is a better program for most uses, and it will run under Windows. You would have to be willing to sacrifice the wider range of terminal types supported, especially the special support for VM/CMS available in the U of T version of ProComm. The U of T ProComm is available free from UTCS as part of a University-wide license. Windows Terminal comes included with Microsoft Windows.

GUIs and Users with Disabilities

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Graphical User Interfaces (GUIs) are ideal for the person who has everything, except for the person who may have a visual or physical impairment! Such a person may find GUIs, as we now know them on the Macintosh or in Microsoft Windows, to be the greatest barrier yet faced in accessing a computer. Through rethinking how a GUI should work and with the addition of some specialized software, access is possible while maintaining some of the power of a GUI.

The key feature of a GUI is the notion of direct manipulation, whereby objects such as text, menus, and graphical elements are manipulated using a mouse or other pointing device in a fashion analogous to real-world manipulation. In the real world, we depend upon eye-hand coordination to get the job done. We can take our experiences in the real world, apply them on the computer that has a GUI, and readily perform tasks that may be arduous with a conventional command-based interface.

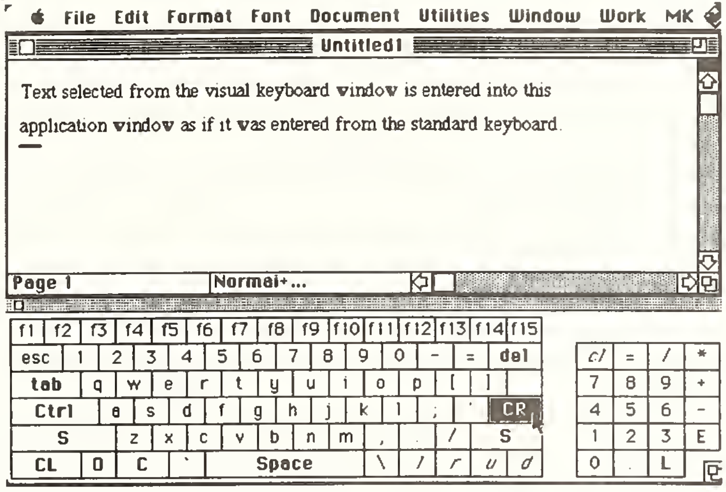
If a person does not have the real-world experience of manipulation due to some form of disability, then the entire basis behind a direct-manipulation style interface breaks down. Someone with a physical disability may be unable to manipulate objects in the real world, let alone on a computer.

To date, many techniques have been developed to allow people with physical disabilities to use traditional text-based interfaces. For example, people with physical disabilities can enter text into a computer through alternative keyboards (e.g., expanded or miniature), by scanning and selecting from an array of alphanumerics displayed on the computer screen or on a separate device with as little as a single switch, or by using Morse Code with one or two switches. Hardware and software solutions provide these functions by emulating the standard keyboard. The combination of keyboard and mouse, however, is not so easily emulated in a GUI.

Most of the problems posed by direct manipulation relate to the physical demands of the pointing device. The use of a pointing device basically involves four steps: moving the pointing device with relatively fine continuous control, clicking one or more buttons, dragging the pointing device while holding the button, and moving between the keyboard and pointing device. These actions may be difficult for many people. Solutions to address these problems are starting to appear in the marketplace, but many problems remain.

There are four major ways in which alternate access to a GUI is possible:

1) *Throw the mouse away and use the keyboard only.* With some GUIs, such as Windows 3.0, this is entirely possible since all direct manipulation actions can be accomplished with a keystroke. Mouse input is lost, but arrow keys may be used to step through menus or text. Many of the advantages of a GUI, however, are lost with this approach.
2) *Use another pointing device and modify it, if necessary, to make it easier to use.* The biggest problem lies in the use of the buttons for selection and dragging. For some persons, it may be very difficult to hold the pointing device on target while clicking, and it may be impossible to hold the button down while dragging. A latching-style button can ease the situation. Another major problem is the integrated use of the pointing device and the keyboard. For best performance, both vie for space in their positioning with respect to the user, and it is often difficult to effectively move between the devices.
3) *Emulate the mouse with discrete switches or with cursor keys.* MouseKeys, within the Easy Access "init" file on the Macintosh, does exactly this. Once MouseKeys has been turned on, the user can move the screen pointer by holding down various keys on the numeric keypad. Button clicks are simulated by pressing a key and the button can be latched down. While this solution comes standard on the Macintosh and it seems feasible, it is not very functional. The person who lacks the physical control necessary to use any pointing device generally lacks the ability to use MouseKeys. MouseKeys is, however, a wonderful tool for graphic or CAD designers who need to nudge selections one pixel at a time.
4) *Display a visual representation of a keyboard, a "visual keyboard," in a window on the screen.* Selecting one of its keys would transmit a keystroke to the application running in another window. That application would respond as if a keystroke were entered from the standard keyboard.


File Edit Format Font Document Utilities Window Work MK
Untitled1
Page 1
Normal+...
f1 f2 f3 f4 f5 f6 f7 f8 f9 f10 f11 f12 f13 f14 f15
esc 1 2 3 4 5 6 7 8 9 0 - = del
tab q w e r t y u i o p [ ]
Ctrl a s d f g h j k l ; ' CR
S z x c v b n m , . / S
CL O C ` Space \ / r u d
c/ = / *
7 8 9 +
4 5 6 -
1 2 3 E
0 . L

Text selected from the visual keyboard window is entered into this application window as if it was entered from the standard keyboard.

Figure 1: Mac•Keyboard: a visual keyboard for entering text within a GUI standard application with some pointing device.

Selecting a key can be accomplished in two ways: by using a pointing device and by scanning. If a pointing device is employed, then it can be used for both text entry and for direct manipulation operations. This gets around the problem of switching between input devices. Mac•Keyboard (*Figure 1*), developed by Apple Canada Ltd. and the National Research Council, is an example of a visual keyboard for the Macintosh that is designed for pointer input.

Typically, some type of head-pointing device is used with a visual keyboard. At the Hugh MacMillan Rehabilitation Centre in Toronto, my research team is developing one such device based on the principle of a light pen that can be worn on the head. Other devices use ultrasonic sensing position, or the reflection of infrared light off a reflector mounted on eyeglasses or a headband.

When scanning is used, the keys on the visual keyboard are repetitively highlighted in some pattern such as row by row, and then across a row, key by key. Pressing a single button or switch first selects the row with the desired key; pressing it again selects the desired key within that row.

Two major problems arise with visual keyboards. The first is implementation specific: current GUIs are not designed to support two active windows. While most GUIs support multiple applications in their own window, and multitasking may allow activities to take place simultaneously, only one window can have the active focus where input is directed from a keyboard and mouse.

Thus, when you select from a visual keyboard, it becomes the active window. When it sends its keystroke to the application, that application becomes active. This switching of active windows is unacceptable. When we select from a visual keyboard, we don't want the cursor or highlights in the application to disappear since we would not know where the keystroke will go. Mac•Keyboard gets around this by clever programming that rewrites a portion of the Macintosh operating system. This solution is only as good as the current operating system, however, and will not work with future systems since it breaks all good programming rules.

My research team has developed a more elegant visual keyboard solution for Windows 3.0, staying within the bounds of available programming features. Our solution is to stop the visual keyboard from becoming active. While still responding to the pointing device, the visual keyboard window itself never becomes active, thus enabling the application to remain active. Keystrokes are sent to the application through inter-application communication. If more than one application window is visible, keystrokes can be directed to a particular window by simply clicking within it just as one would with a standard mouse. Throughout all of this, the standard keyboard is operational.

The second problem is more pragmatic. A visual keyboard that utilizes scanning cannot provide full effective access to a GUI. A GUI employs gadgets such as menus, scroll bars, tool palettes, and so on, that are manipulated by the mouse. How can these be controlled through a visual keyboard? If the GUI is designed for total keyboard control, then it may be possible to access the gadgets by scanning to select the appropriate keystrokes. This becomes impractical when it comes to cursor manipulation. It may take several seconds to select one key by scanning. Imagine how many minutes it would take to select a cursor key enough times to move the pointer across the screen!

If the GUI does not support keyboard equivalents to mouse actions such as with the Macintosh Finder, some alternative scanning solutions are needed. Possibly, the gadgets themselves could be scanned in succession. This may work with some but not with others, such as scroll bars. Moving the cursor within text presents the most daunting problem. Our research has investigated simulating a GUI in which we scan the text itself, for instance, by paragraphs, sentences, words, and characters. However, the issue comes down to the fact that a scanning visual keyboard within a GUI is not a functional solution yet, and will not be effective until more research is carried out.

In summary, GUIs and their inherent direct-manipulation style of interaction present a difficult environment for people with disabilities to access. Much research and development still remains before these environments will be accessible. For more information on current research, please write to me care of ARPP, University of Toronto Computing Services, 4 Bancroft Avenue, Toronto, Ontario M5S 1A1, or send a message by electronic mail to shein@gpu.utcs.utoronto.ca.

First Annual Academic Conference for SPSS Users

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The First Annual Academic Conference for SPSS Users was hosted by McGill University and held in Montreal, Quebec from June 12 through 15, 1990. The idea for this conference came from staff at McGill University's Computing Centre. The main purpose of the meeting was to gather together academics, researchers, and user support staff to discuss their experiences using SPSS software for research and teaching. There were over 100 attendees, including several people from SPSS Inc. Most of the attendees were from colleges and universities across Canada and the United States.

The conference program consisted of a keynote address, sessions of contributed papers, and SPSS training sessions. The keynote address was presented by Mark Battaglia, Vice-President of Marketing, of SPSS Inc. He discussed the recent trends in statistical computing, such as the increased emphasis on visualization of data in new statistics packages. He also described some of SPSS's recent achievements, their short-term plans, and the future direction of the company.

Recent achievements include the release of SPSS with a graphical user interface for the Macintosh and for OS/2, and version 4 of SPSS for the mainframe. The SPSS/PC+ package has also been upgraded recently to include new statistics procedures such as logistic regression and examine for exploratory data analysis. New add-on modules for correspondence analysis and CHAID (chi-square automatic interaction detection) analysis are also available for the PC.

SPSS Inc. has decided that its software will remain a statistics package, and has no intention of marketing its software as a fourth-generation language or as an executive information system. The company's future development efforts will be in the areas of new statistics procedures and add-on products. It may also develop an "expert system"- type product for users with little statistics knowledge. SPSS Inc. will continue research efforts to improve SPSS's graphics capabilities.

The contributed paper sessions focussed mainly on the experiences of teaching courses in which SPSS was the software tool students used. The sessions included discussions about SPSS/PC+ Studentware. Related papers dealing with training issues were also presented. In other sessions, a variety of applications of SPSS in research projects was described.

SPSS Inc. was well represented at this conference. They held their two day ANOVA training course in conjunction with the conference. (An extra fee was required to attend this course.) They also held several training sessions throughout the conference, including a session on the graphical user interface for the Macintosh and OS/2, and an introduction to the new Categories and CHAID add-on products. There was also a demonstration area where SPSS software was running under various operating systems: MS-DOS, Macintosh, OS/2, and UNIX.

The newly-released SPSS products for the Macintosh and OS/2 make use of a graphical user interface that looks similar to the SPSS/PC+ menu and help windows. The graphical user interfaces, Macintosh's desktop and OS/2's Presentation Manager, though, are much easier to use and are more powerful. The multitasking abilities of the Macintosh and OS/2 environments are also a plus. The SPSS software for these platforms is the same software which has been released previously for mainframe computers, minicomputers, and workstations.

The organizers from McGill put together a good first-time conference. The attendees were enthusiastic about continuing to have a conference for SPSS's academic users. Next year's conference can only be better. My only suggestion would be to have more variety in the types of papers presented. For example, I would like a session which deals with the experiences of the user support staff. People who use SPSS in the courses they teach or in their research, though, would find the conference to be educational.

Next year, the Second Annual Academic Conference for SPSS Users will again be hosted by McGill University. Details such as dates and location are unavailable at time of writing. If you are interested in attending the conference or presenting a paper, please call Sandra Gardner at 978-5128 to have your name forwarded to the conference organizers.

(UTCS currently offers SPSS/PC+ version 3.1 site license for $100 per machine per annum. SPSS^X version 3 – and soon version 4 – is also available on our mainframe under VM/CMS. If you are interested in SPSS for the Macintosh, OS/2, or UNIX please contact SPSS Inc. directly at 444 North Michigan Avenue, Chicago, IL 60611. Their telephone number is 312-329-3500.)

New SAS/GRAPH Seminar!

During this seminar, SAS/PC users will be introduced to SAS/GRAPH, SAS' high resolution graphics package. If you licensed SAS/PC from UTCS, you were provided with the SAS/GRAPH software as part of the basic SAS package. This seminar has been designed to help those of you who have installed SAS/GRAPH but have never used any of the procedures. The following topics will be covered in the course:

Software considerations: SAS/GRAPH versus other graphics packages – advantages and disadvantages; a review of the types of graphs that can be produced by SAS/GRAPH (procedures GCHART, GPLOT, GSLIDE, G3D, and GMAP); enhancing graphs (statements TITLE, FOOTNOTE, PATTERN, SYMBOL, AXIS, and LEGEND).

Hardware considerations: how to set up SAS/GRAPH for your monitor, printer, or plotter (procedures GDEVICE and GTESTIT). Includes a discussion on how to create a graphics stream file.

Graph management: how to save graphs permanently and display them at a later date (procedure GREPLAY). Includes a discussion about SAS catalogs and SAS libraries.

Advanced topics: how to display multiple graphs on a page (procedure GREPLAY); how to annotate your graphs (ANNOTATE data sets).

Class size is limited in this hands-on course. Please contact Irene Rosiecki at 978-4565 to find out about dates and times, and to find out about registration procedures. Courses are filled on a first-come, first-served basis.

Prerequisite: Introduction to SAS or equivalent experience with SAS.

1990 SIAM General Meeting

and a Short Course on Chaotic Dynamics, an Emerging Science

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From July 15 through July 20 this summer, I attended the general meeting of the Society for Industrial and Applied Mathematics (SIAM). These meetings usually commence with a one-day course on a topical subject. Two years ago the subject was Chaotic Dynamics, and this year it was repeated. The fact that Chaotic Dynamics has been the subject twice underscores the growing recognition of the importance of this new field of applied mathematics.

This year's course consisted of four 90 minute lectures: "Introduction and Basic Concepts" and "Strange Attractors" (both given by Celso Grebogi of the University of Maryland), plus "Bifurcation to Chaos" and "Fractal Basin Boundaries" (delivered by James A. Yorke, also from the University of Maryland). Talks were presented at a fairly elementary level, obviously aimed at participants who had very little exposure to this field. James A. Yorke announced that his office at the university distributes a program for the analysis of chaotic systems. This dynamics program is interactive and runs on PCs and UNIX workstations (under X Windows). Yorke's office charges US$40 for the program and the manual. UTCS hopes to have a copy of it soon.

The meeting itself consisted of 14 invited lectures, 66 minisymposia, and 33 sessions for contributed presentations. Some of the invited lectures were as follows:

"Algebraic Computation Comes of Age," Anthony C. Hearn, The RAND Corporation;

"Wavelets Making Waves in Mathematics and Engineering," Ingrid Daubechies, AT&T Bell Labs;

"Fingers, Dendrites and Cracks: Modelling Unstable Growth Processes," George M. Homsy, Stanford University;

"Networks in Neurophysiology: Mathware for Wetware," Nancy Kopell, Boston University;

"Wanted: Applied Mathematicians to try the Fruit Fly Challenge," Garret M. Odell, University of Washington;

"Geometric Bounds for Eigenvalues," Persi Diaconis, Harvard University;

"Control of Systems Arising in Flexible Structures," Irena Lasiecka, University of Virginia;

"Crystal Microstructure Via Elasticity Theory," John M. Ball, Heriot-Watt University (Edinburgh);

"Nonlinear Morphologies in Directional Solidification," Stephen H. Davis, Northwestern University;

"Ill-posed problems in Granular Flow," David G. Schaeffer, Duke University;

"Solving Large-Scale Combinatorial Optimization Problems in Practice," Martin Groetschel, Universitat Augsburg (Germany).

Many minisymposia dealt with subjects discussed in the invited lectures. There was, for instance, a minisymposium on analysis of chaotic experimental data, one on chaos in control systems, and another one on recent mathematical developments in chaotic dynamics. Several minisymposia discussed various applications of wavelets, and a few others various aspects of symbolic computing. Biological applications of mathematics were quite prominent in the invited lectures, minisymposia, and contributed papers. A minisymposium on matrix computation was chaired by David Foulser, one of the authors of CLAM software. (See page 39 for a review of CLAM.) Other topics included neural networks, mathematical modelling, inverse problems, several aspects of control systems, and nonlinear optimization. There were also sessions on problems of mathematical education. As usual, the meeting was accompanied by exhibits from scientific publishers and software exhibits as well.

A program from the conference and abstracts of the talks are available if you are interested. If you would like more information about the meeting, or copies of the programs and abstracts, please call Andrzej Pindor at 978-5045.

CLAM: Matrix-Based Computing Environment for UNIX Workstations

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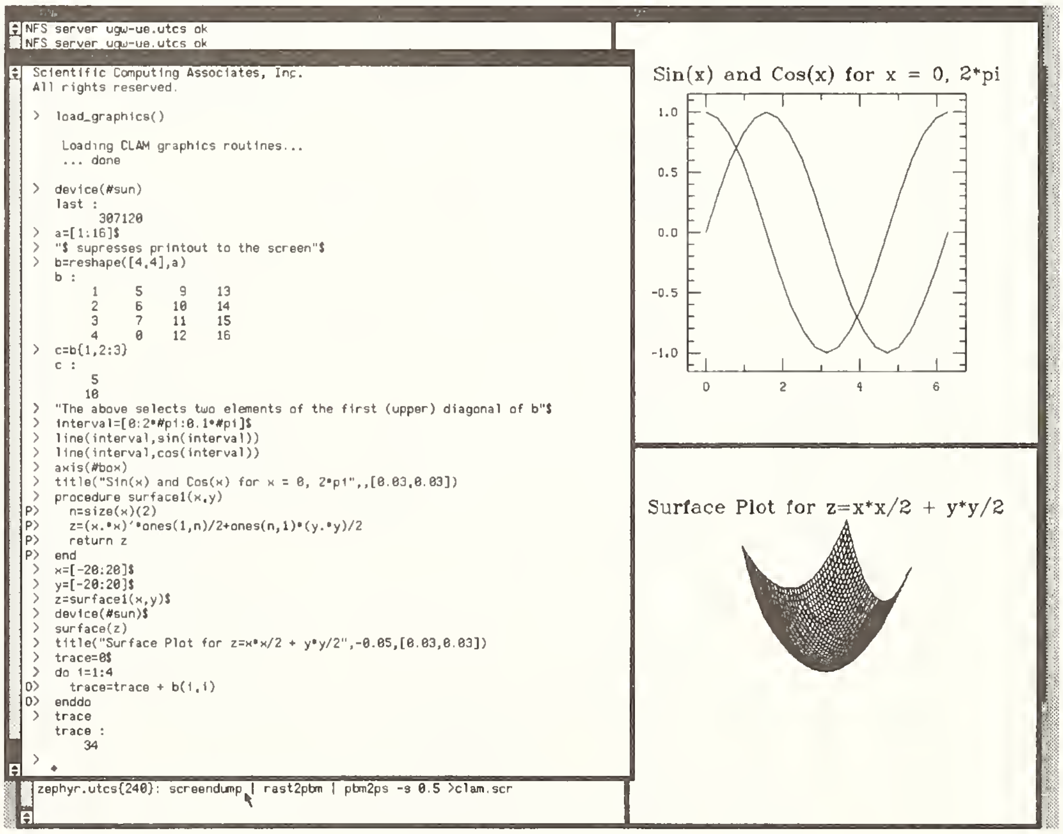
CLAM (Computational Linear Algebra Machine) is an interactive programming language and development environment for UNIX workstations. It is available for SUN-3 workstations, SPARCstations, DECstations, HP9000 series 300, and other computers.

CLAM automatically handles vector and matrix data structures, and automatically selects the appropriate algorithms from its own internal library to match the solution techniques to the problem size and characteristics. Additionally, CLAM includes a powerful yet simple-to-use graphics component.

All numeric variables in CLAM are double precision (64-bit). Complex and character variables are provided as well. A very nice feature of CLAM is that it automatically declares and sizes variables, although in specific circumstances it may be desirable for you to declare a matrix explicitly (particularly in the case of large matrices).

For its linear algebra algorithms, CLAM uses many of the LINPACK solvers, SMPAK sparse linear



```
NFS server ugw-ue.utcs ok
NFS server ugw-ue.utcs ok

 Scientific Computing Associates, Inc.
 All rights reserved.

 >  load_graphics()

     Loading CLAM graphics routines...
     ... done

 >  device(#sun)
    last :
          307120
 >  a=[1:16]$
 >  "$ supresses printout to the screen"$
 >  b=reshape([4,4],a)
    b :
         1     5     9    13
         2     6    10    14
         3     7    11    15
         4     0    12    16
 >  c=b{1,2:3}
    c :
         5
        10
 >  "The above selects two elements of the first (upper) diagonal of b"$
 >  interval=[0:2*#pi:0.1*#pi]$
 >  line(interval,sin(interval))
 >  line(interval,cos(interval))
 >  axis(#box)
 >  title("Sin(x) and Cos(x) for x = 0, 2*pi",,[0.03,0.03])
 >  procedure surface1(x,y)
P>    n=size(x)(2)
P>    z=(x.*x)'*ones(1,n)/2+ones(n,1)*(y.*y)/2
P>    return z
P>  end
 >  x=[-20:20]$
 >  y=[-20:20]$
 >  z=surface1(x,y)$
 >  device(#sun)$
 >  surface(z)
 >  title("Surface Plot for z=x*x/2 + y*y/2",-0.05,[0.03,0.03])
 >  trace=0$
 >  do i=1:4
D>    trace=trace + b(i,i)
D>  enddo
 >  trace
    trace :
        34
 >
zephyr.utcs(240): screendump | rast2pbm | pbm2ps -s 0.5 >clam.scr
```

Sin(x) and Cos(x) for x = 0, 2*pi
1.0
0.5
0.0
-0.5
-1.0
0
2
4
6
Surface Plot for z=x*x/2 + y*y/2

Figure 1:
SUN-3 screen with CLAM session running under SunView. You can see various CLAM statements including procedure definition and a small do loop. Two graphs (a 2D and a surface graph) are created and displayed in separate SunView windows, seen on right side of the screen.

system solvers, and some routines from EISPACK. It also uses a public domain library of Fast Fourier Transform (FFT) routines developed by Swartztrauber.

Figure 1 shows an example of some CLAM statements and constructs, as well as a declaration of a procedure (see below for more information). Note the change of prompt inside a do loop and inside a procedure declaration. CLAM provides several different prompts to indicate the "level" of the present command line. Besides the main, or conversational level, levels include various control structures (do, if, loop), the debugger (see below), the help system, and a few more.

Interactive Capabilities

CLAM provides a variety of built-in operations, such as a full selection of elementary functions, FFTs, sorting, (pseudo) random-number generation, and a number of solvers for systems of linear equations. There are also several predefined matrices available. To solve a system of linear equations Ax=b, it is enough to write: x=A\b . Data can be read from an external ASCII file, and can also be written to an external file using C-like format descriptors. A whole matrix can be written out to a file with a single statement and read in from the file the same way. Unformatted write and unformatted read statements are also available. The interactive graphics component (see below) allows you to visualize your data immediately.

There are three control structures: if...else...endif, do (for counter-controlled loops) and loop (for condition-controlled loops). Three types of matrix subscripting are available: submatrix selection, scatter-gather selection, and diagonal selection. This last one, which I have not encountered in similar software products, accesses part of a diagonal of a matrix (any diagonal, not just the main one). This feature is illustrated in *Figure 1.*

Interactively accessible matrix operations include Cholesky decomposition, LU decomposition, QR decomposition, and Singular value decomposition.

There are also options for saving the contents of the workspace, with all variables and procedures, so that you can continue the CLAM session at a a later time. You can load a previously-saved workspace in its entirety or selectively, i.e., choosing only specified variables or procedures.

Programming Capabilities

Although the program has a large collection of built-in procedures, CLAM allows you to define your own procedures. A procedure is a collection of CLAM statements that you want to be performed whenever required. The three control structures described above provide procedures with adequate programming flexibility. The procedures can be saved into a file and used later. They can call other procedures and can be passed as arguments. Procedures may take zero or more arguments; you can define procedures with variable (and indeterminate) numbers of arguments. Variables can be passed to procedures either as arguments or by declaring them as "global" at the conversational level. Arguments to a procedure can be affected by the procedure, and a procedure can also "return" a value (which can be a vector or a matrix), as seen in *Figure 1.*

CLAM provides an interactive, easy-to-use debugger. You can either set breakpoints in a procedure where deemed necessary, or force the debugger to stop at a line containing an error. While you are using the debugger, the procedure can be executed step by step, the values of variables can be checked, and so on. In fact, most of the CLAM commands are available at this stage, which gives the debugger a lot of power. Most of the error messages are self-explanatory, but they are very brief and I found some of them a little cryptic at first. It seems to me that the manual should contain a list of error messages with explanations of their possible meanings.

CLAM also has the ability to call foreign FORTRAN and C programs through a simple interface.

Graphics Capabilities

CLAM graphics allows you to create two- or three-dimensional (2D or 3D) plots, to create contour plots, to view a 3D plot from any angle, to change the scaling of data, to incorporate text with graphics, and so on. *Figure 1* demonstrates some of the plotting capabilities, together with the CLAM statements used to create the plots. You can see how easy it is to create a plot. In addition to the high-level graphics commands mentioned above, there is also a low-level library of graphics primitives available for more ambitious users. CLAM also has animation capability. You can generate a series of graphs and then display them in rapid succession. I have found this feature very easy to use and very useful.

CLAM has full-fledged online help, which is accessible at any stage of a session. The help is organized in a tree-like structure; a command prompt always indicates at which level of help you are.

CLAM may be compared to other matrix-based packages, such as GAUSS or MATLAB. The clear advantage to CLAM is that it allows three storage formats for matrices–dense, banded, and sparse–and automatically chooses suitable algorithms to handle the matrices, depending on their storage formats. This may be of considerable importance to users who deal with large, sparse matrices.

Scientific Computing Associates, who created CLAM, recently released CLAMshell, an X Windows application that serves as an interface to CLAM. Unfortunately, I have not had access to this product.

In summary, CLAM is an interesting product, which may prove very useful to UNIX workstation users who deal with scientific and engineering applications. Built-in linear algebra operations and special treatment of sparse matrices could be of great use to some users, whereas powerful and easy-to-use graphics, plus the simple yet flexible programming language should appeal to everyone. An additional attraction of the package is its low price for academic users (see "Pricing"). Note that any graphics package alone would be much more expensive.

Vendor:
Scientific Computing
Associates, Inc.
246 Church Street, Suite 307
New Haven, CT 06510
USA

Pricing:
Campus-wide license (unlimited number of workstations) US$400-US$800 depending on workstation type ($400 for all SUN-3 workstations)

For Your Information. . .

Free Engineering Software

Andrzej Pindor
apindor@vm.utcs.utoronto.ca

I have heard from the University of Waterloo that a Canadian company, Cube Systems, is willing to give to universities, free of charge, a software package called Finesse/f. The software does structural analysis for two- and three-dimensional trusses and frames. Interested persons should write to Cube Systems at 77 Metcalf Street, Ottawa, Ontario, K1P 5L6, or call (613) 236-7067.

ProComm Communications Program Seminar

Date and time to be announced

ProComm is a general purpose communications program currently available to all U of T faculty, staff, and students. It is suitable for connecting to the many networks on campus.

A seminar has been scheduled to introduce ProComm and its various features: terminal emulation (a number of popular ones will be reviewed); the dialing directory; file transfer protocols, such as Kermit and XMODEM; configuration and modem parameter settings; and the DOS gateway, which allows you to execute DOS commands and other programs while you are still in ProComm.

There is a fee for this seminar. Copies of ProComm are made available at no charge to members of the University, but you must bring your own diskettes (two 5.25" or one 3.5").

To reserve a place in this seminar, please contact Irene Rosiecki at 978-4565.

Free NetNorth (Electronic Mail) Demonstration

Date and time to be announced

Anyone interested in sending documents to colleagues or friends reliably, quickly, and inexpensively will not want to miss this demonstration. We will introduce you to the NetNorth/BITNET/EARN communications network, which is accessible from the CMS system. This network connects more than a thousand universities and research institutes in Europe, Asia, and North America. Sending documents or files over the network is very easy to learn.

We will show you how to send mail and files to another institution, and how to talk directly to someone on the network. ***Please note this is a demonstration only.***

Space is limited. If you would like to attend one of these sessions, please contact Irene Rosiecki at 978-4565 to reserve a place.

CHICO SOLVER

Andrzej J. Pindor
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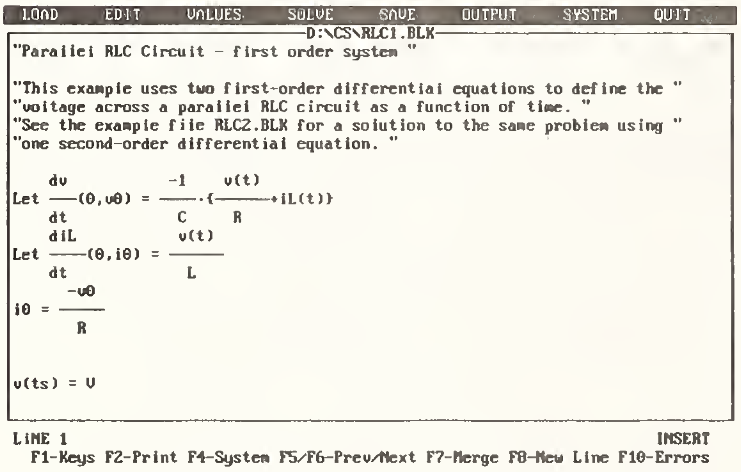
CHICO SOLVER is a general-purpose equation solver package for IBM and compatible microcomputers. It is designed to match the mathematics used in engineering design and analysis. It can solve systems of nonlinear equations, systems of ordinary differential equations, and mixtures of the two. Equations can also contain integrals. Complex numbers can be handled as easily as real ones.

CHICO SOLVER is menu-driven. When the package is invoked, a screen, as seen in *Figure 1,* appears. At the top of the screen you see a menu bar. Highlighting an item and pressing the Enter key executes your choice. Following is a list of menu options and their meanings:

- *LOAD* loads a previously-created equations file into the editor. It is also used to name a new equations file that is being created.



```
D:\CS\RLC1.BLK
"Parallel RLC Circuit - first order system "

"This example uses two first-order differential equations to define the "
"voltage across a parallel RLC circuit as a function of time. "
"See the example file RLC2.BLK for a solution to the same problem using "
"one second-order differential equation. "

    dv              -1     v(t)
Let ——(0,v0) = ——·{————+iL(t)}
    dt               C      R
    diL              v(t)
Let ———(0,i0) = ————
    dt                L
      -v0
i0 = ———
       R


v(ts) = V

LINE 1                                                          INSERT
  F1-Keys F2-Print F4-System F5/F6-Prev/Next F7-Merge F8-New Line F10-Errors
```

Figure 1: Edit screen of CHICO SOLVER.

- *EDIT* opens up the editor. Here you type in equations. As seen in *Figure 1,* equations can be interspersed with comments, which are enclosed in double quotes. Several specialized mathematical symbols are available: product and divide line (see *Figure 1*), integral, summation, derivative (also seen in *Figure 1*), square root, and cross product (for vectors). Greek letters can also be used. CHICO SOLVER performs integrals using a modified version of Simpson's rule, so it may have problems with integrals which have any sort of singularity, particularly at the ends of integration intervals.
- *VALUES* allows you to assign status to the parameters appearing in your equations, designating them either as KNOWN or UNKNOWN. CHICO SOLVER checks whether the number of equations matches the number of UNKNOWNS, and also checks the consistency of your equations and reports any possible problems. In this screen, you provide estimates for the UNKNOWNS, and you define for each UNKNOWN variable (parameter) a region where the program looks for solutions. Additionally, you can perform a parametric study, i.e., solve your system of equations for a range of values of one of the parameters. *Figure 2* shows the VALUES screen for the equations from *Figure 1.*
- *SOLVE* solves the set of equations or executes a parameter study. In the second case, you are asked for the name of the file into which the results will be placed. If there are any problems solving the equations (like reduced accuracy due to integration or inexact solutions), they will be reported in this screen. CHICO SOLVER considers a set of equations solved if both sides of all equations agree to eight significant digits. However, integrals and solutions to differential equations are computed to only five digits of accuracy.
- *SAVE* allows you to save the active file. The demonstration version of CHICO SOLVER I received from the vendor has this feature disabled, so I could not test it.
- *OUTPUT* allows you to view the results, and then print them or write them to a file. Reports can be generated showing equations, parameter values, or parametric study results. Again, the demonstration version I received would not let me print the results, nor write them to a file.
- *SYSTEM* can display files from a directory, change the current directory, and access the

DOS operating system.

- *QUIT* quits the program.

As indicated above, CHICO SOLVER allows individual parameter values to be designated as KNOWN or UNKNOWN. This way, it is possible to experiment with different choices of UNKNOWNs and to investigate the solvability of a problem under different conditions. This feature, together with the parametric study option described above, allows for a variety of modelling and simulation studies. Besides checking the consistency of a system of equations to be solved, CHICO SOLVER also tries to determine whether the system can, perhaps, be decoupled into a set of smaller, independent systems, which the program will then proceed to solve. In many cases, it will mean a considerable reduction in solving time.

CHICO SOLVER has a number of elementary built-in functions, and you can also define your own functions either explicitly or through their derivatives (see *Figure 1*).

CHICO SOLVER has two versions: a student version and a full version. The table below shows the limitations of these versions:

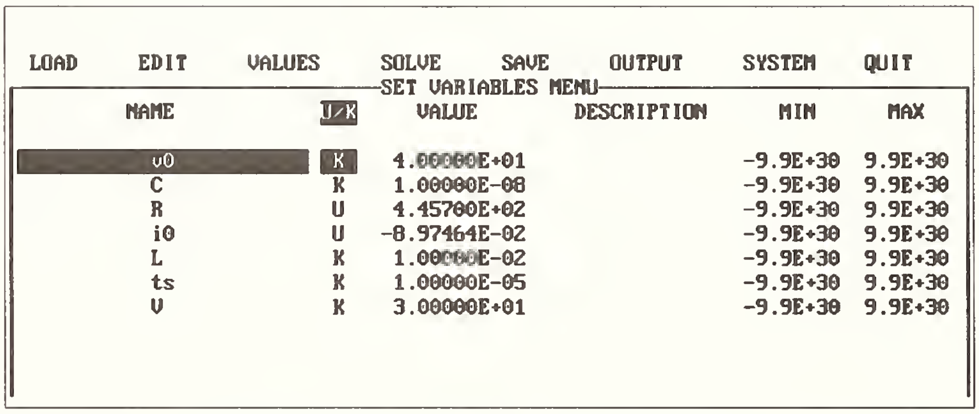
	Student	Full
Results	35	240
Parameters	128	240
Array size	100	240
Sum indices	100	240
User functions	10	50
ODE* order	4	10
ODE system size	3	30

(*ordinary differential equations)

There is also a demonstration version available. It has a full functionality, except that it does not allow you to print or save to a file.

In conclusion, CHICO SOLVER is an interesting product, with several useful features not available in similar packages. Its ordinary differential equations solving capability, combined with its simplicity of use, will appeal to many users. CHICO SOLVER also has a considerable potential for educational purposes. There are, however, several aspects of the package which could be improved. Starting from the least important one, they are:

1. Choice of colours.
   The colours used for main screens and for pop-up windows may not appeal to everyone (they were a bit annoying to me) and there is no way inside the program to change the colour palette.
2. The presentation of equations could be improved by more natural placement of power exponents (at the moment, a to power b is written as a^b).
3. A rudimentary graphics capability, at least, should be included to help analyze parametric studies (it seems that such an extension of the package is planned for the near future).
4. For a dedicated package, even with such impressive capabilities with respect to problem size (see the table above), the price of the package is far too high. On the other hand, pricing of the student version is very reasonable (see below for pricing information).



```
 LOAD      EDIT      VALUES      SOLVE     SAVE      OUTPUT      SYSTEM     QUIT
                                 SET VARIABLES MENU
            NAME              U/K     VALUE        DESCRIPTION       MIN        MAX

             v0               K     4.00000E+01                  -9.9E+30   9.9E+30
             C                K     1.00000E-08                  -9.9E+30   9.9E+30
             R                U     4.45700E+02                  -9.9E+30   9.9E+30
             i0               U    -8.97464E-02                  -9.9E+30   9.9E+30
             L                K     1.00000E-02                  -9.9E+30   9.9E+30
             ts               K     1.00000E-05                  -9.9E+30   9.9E+30
             V                K     3.00000E+01                  -9.9E+30   9.9E+30
```

Figure 2: VALUES screen where you provide estimates of parameters, designate them as KNOWN or UNKNOWN, and define regions

Hardware Requirements:
IBM PC/AT or compatible, 512 kiblobytes of RAM at least,
80x87 coprocessor and hard disk recommended.

Vendor:
CHICO Software Company
142 West Second Street
Chico, CA 95927-5174
USA
(916) 342-EASY

Pricing:
US$499 full version
US$35 student version
(there are also volume discounts)

Colour Scanning Available at UTCS

Terry Jones
tj@vm.utcs.utoronto.ca

UTCS now has a new scanner for scanning photographs, a Sharp JX-100 4" x 6" colour scanner capable of scanning colour photographs into your computer. You can scan colour and black-and-white photographs. Black and white photographs are saved as grey scale images with 256 grey levels. Colour photographs are saved as 24-bit colour files containing up to 16 million colours.

The Sharp JX-100 is compatible with both IBM/PC and Apple Macintosh computers. On the Macintosh, the JX-100 saves scanned photographs as colour PICT files. On the IBM/PC, the JX-100 can save PCX (PC Paintbrush), TIFF, PostScript, and TARGA format files.

Photographs can be scanned at different resolutions depending on the final quality required. The scanner uses scanning resolutions from 50 dots per inch to 200 dots per inch. It produces some striking images with very pleasing colour. The image files produced can be used in desktop publishing and desktop presentation packages.

The Sharp scanner is positioned on top of the item to be scanned, and thus can be used to scan images that would not otherwise fit into our existing scanner (photos from bound publications or parts of large originals).

If you have a program such as Adobe Photoshop, you can use the scanned image to create a file that will generate colour-separated output on a typesetter. You can also create separations in PageMaker if you have purchased PageMaker's colour extension. UTCS's typesetter is not powerful enough to print the separations, but there are service bureaus in Toronto that have the equipment to do this.

UTCS also has a larger DEST black and white scanner available. This can scan text and pictures up to 8.5" x 14", and can convert some scanned text into a word-processing document (Optical Character Recognition or OCR).

For more information regarding the new Sharp JX-100 colour scanner or other scanning services available at UTCS, please contact Terry Jones at 978-4924.

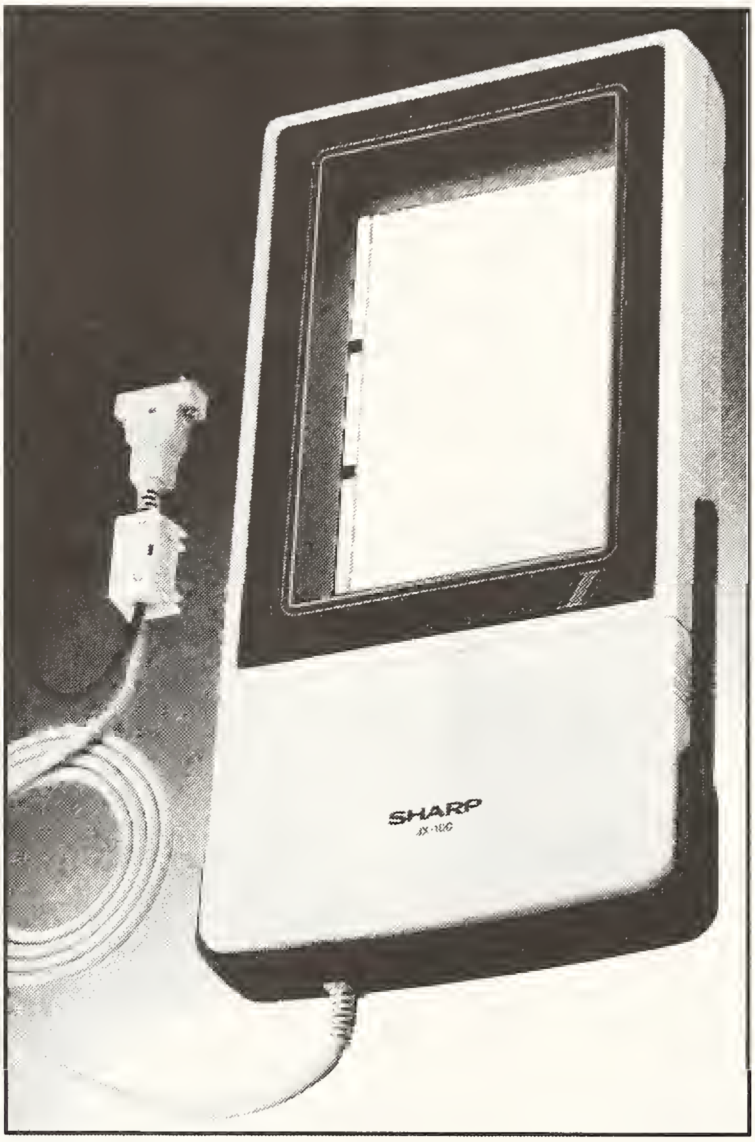


Figure 1: The Sharp JX-100 scanner. The image was scanned with the Sharp JX-100 scanner, saved as a PICT file, and imported into PageMaker.

N.B. Ibid.

Geoffrey Rockwell
rockwell@gpu.utcs.utoronto.ca

If you own Nota Bene, a PC word-processing program, and want to manage bibliographic information, you should look at **N.B. Ibid**. Ibid is a fully-featured personal bibliographic management system (PBMS) that works with version 3.0 of Nota Bene. You have to install Ibid onto Nota Bene. It is not a standalone product, so if you do not own Nota Bene you cannot use it. Once you have installed Ibid, you can open it from within Nota Bene. (You will not have to upgrade your hardware to run Ibid. If you are already running Nota Bene on your machine, Ibid will run as well.)

The advantage of installing Ibid into Nota Bene is that you can have it at your fingertips when you are writing your papers. If you are writing and want to check a reference, you can do so without leaving the word processor. In addition, you can drop citations from Ibid into the word-processing document. Ibid, in turn, can use these in-text markers to generate a bibliography specifically for the marked document. The citations dropped into the document, however, are not reformatted to any particular style by Ibid. Despite the name "Ibid", which suggests that the program can recognize a second reference to the same work, you have to edit the in-text citation yourself. Nonetheless, the integration of word-processor and PBMS is superb, and I expect it will get better since both programs are from the same company.

Ibid lacks little in the way of features. It has a rich search environment; it can generate subject bibliographies (where a reference might appear more than once under different subject headings); and it allows you to customize both the formatting styles for bibliographies and the sort order. It seems particularly tailored to humanists who are, after all, the major users of Nota Bene. Ibid can handle 32,000 records, with a limit of 65,000 characters per record. This means you can have a field with a long abstract or set of notes for each record. The only drawback is that it cannot import or export bibliographic information from other sources. For example, if I search one of the CD ROMs at the Robarts Library, and download the results of the search to a floppy diskette, I would like to be able to import the results into my PBMS. This is not possible with Ibid.

If you own Nota Bene, you should definitely consider Ibid as a convenient extension to your scholarly computing environment. N.B. Ibid (Level 1) is published by:

Dragonfly Software
285 West Broadway, Suite 600
New York, N. Y. 10013-2204
(212) 334-0445

You can order Ibid through the UTCS Information Office at 978-4990, or you may purchase it directly from Dragonfly Software using the Academic Discount Coupon available free of charge from UTCS. For more information about Ibid or to arrange a demonstration, call Geoffrey Rockwell at 978-4548.

UTCS Services

Facilities Managed by UTCS

Administrative Computing
- administrative IMS, DB2, Batch, and TS0
- 3081K processor, 48 megabytes of memory
- MVS/XA operating system

Computer Disciplines Facility/UNIX
SUN 3/280s, 16 megabytes of memory (zero.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

SUN 3/280s, 16 megabytes of memory (one.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

Computer Disciplines Facility/PC
- 87 NEC computers connected in a Local Area Network
  - Robarts Library (Rm. 1061A): 37 NEC PCs, 24 XT100s
  - St. Michael's College (Rm. 107): 26 NEC PCs, 9 XT100s
  - Sidney Smith (Rm. 1071): 24 NEC PCs
- Sidney Smith (RM. 2105): CQUEST
- Ramsay Wright (RM. 211): CQUEST
- Victoria College (RM. 110): 3 XT100s
- Trinity College (RM. 024): 2 XT100+s
- introductory Computer Science instruction
- MS-DOS with Turing environment

Erindale College Systems
SUN 3/280, 16 megabytes of memory
- instructional and research access using UNIX

VAX 8200, 8 megabytes of memory
- instructional access using VMS
- research access

VAX-11/750, 5 megabytes of memory
- instructional access using UNIX (Berkeley UNIX 4.3BSD)

Institutional Relations System

VAX-11/750, 8 megabytes of memory
- database services to the owner departments using VMS

EPAS Facility
- 4361-5 processor, 16 megabytes of memory
- general VM/CMS services to the owner departments

Ontario Centre for Large Scale Computation (OCLSC)
- Cray Research Inc. X-MP/24
- 2 processors, 4 megawords main memory
- solid state disk (SSD) with 64 megawords of storage
- UNICOS 5.1.10 operating system
- VAX 8350 + MicroVAX II, VAX-11/750, and SUN 3 provide VMS front-end services

> *The mandate of UTCS is to encourage and support the use of information technologies across campus, and to plan, implement, and operate common-carrier networks and certain appropriate central computer facilities.*

UTCS Centrally Owned and Managed

Systems

IBM VM/CMS
Technical Assistance: 978-6602
- General Purpose Timesharing environment
- Hub of the NetNorth network with access to BITNET, EARN and the Internet
- 4381-R02 processor with 32 megabytes of memory
- CP operating system, VM/SP HPO R5
- CMS timesharing system, VM/SP Release 5
- FTP and TELNET access to the campus ethernet, as well as Internet
- RSCS spooling system, Release 2.3

GP UNIX
Technical Assistance: 978-8853
- General Purpose Timesharing under SUN UNIX 4.0.3
- SUN 3/280, 16 megabytes of memory
- access to Linotronic typesetter
- offers a sophisticated and powerful environment for text processing
- offers a sophisticated programming environment suitable for commercial software development or testing
- full access to USENET, an electronic technical information exchange facility
- offers excellent electronic mail facilities and ability to send or receive mail from most computer networks worldwide, such as UUCPNET, ARPANET, NetNorth, BITNET, CSNET, CDNNET

Services

Communications, Networking & Technical Support
Primary Phone: 978-7087
- Communications Group provides communications systems, terminals, modems, data channels; consulting and installation.
- Field Service Group installs and maintains communications and computer systems, particularly IBM PCs and Macintoshes, on a contract basis or on a cost-per-call basis.
- provides consulting on computer systems technology and installs computer systems
- provides access between the IBM systems and machines using UNIX, VMS and other operating systems. Ethernet, Pronet, and IBM TRN technologies are used over various transmission media including optical fibre. More basic communications techniques are also used for moderate speed links.
- provides consulting on local area networking and installs LANS
- provides access to NetNorth (BITNET), the North American Universities Network; ONET, the Ontario Regional Network; CA*net, the Canadian National Network; and USENET, the UNIX networking fraternity
- provides gateway to the US Internet
- will provide a communications solution to department needs on a contractual basis

Information Centre
Primary Phone: 978-HELP
- Provides assistance in use of electronic messaging, including use of Local Area Networks (LANS); NetNorth/BITNET/EARN, the world Universities network; CDNNET, the Canadian X.400 network; ARPANET; CSNET; USENET; and other international connections.
- provides advising, consulting and documentation on:
  - command languages, including CMS and UNIX
  - high-level languages, including FORTRAN, and C
  - packages and libraries, including SAS, SPSS, BMDP, IMSL, and NAg
  - editors and formatters, including XEDIT, ed, nroff/troff
- provides general micro support
  - selection consulting for hardware and software
  - Micro Lab for evaluation of hardware and software
  - advice on University discounts
  - media conversion and data transfer
  - CD-ROM access to software and information discs
  - offers PostScript Laser Printing Service
  - offers 35mm slide production service using Polaroid Palette
  - administers Local Area Network of PCs for Education Facility
  - administers Macintosh Education Facility
- high-quality typesetting
- provide image and typed text scanning
- installs and maintains application packages
- administers site licenses for various software packages

Telephone Listings

Consulting and Enquiries

Applications Support & Advising Supervisor	Alex Nishri	BC214	978-7109
External Marketing Consultant	Ihor Prociuk	BC217	978-6875
Erindale College	Joe Lim	ER2035	828-5311
Information Office	Evelyn Ward	BC201	978-4990
Account & Access Code Enquiries	Sylvia May	BC101B	978-7148
IBM & Macintosh Maintenance	Kam Mark	BC103	978-5050
Tape Library (Academic Services)	Susan Kovago	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
Communication, Networking & Hardware	Rosi Derka-Tseu	BC105	978-7087
UTCS Noncredit Short Courses	Irene Rosiecki	BC217	978-4565

Consulting & Advising Services:	978-HELP
CMS, and GP UNIX userids:	ADVISOR
CMS Userid for mail problems:	POSTMSTR
Network Operations Centre	978-4621
System Status Enquiries (GP UNIX)	978-4318
System Status Enquiries (IBM)	978-7393
Interactive Services 300 (bps)	978-3959
Interactive Services 1200 (bps)	978-3959
Interactive Services 2400 (bps)	978-7239
Interactive Services 9600 (bps)	978-7220

UTCS Directory

Director:	Dr. Warren Jackson	BC118	978-8948	wcj@vm.utcs.utoronto.ca
Associate Director:	Eugene Siciunas	BC116	978-5058	eugene@vm.utcs.utoronto.ca
Managers:				
Communications & Technical Support	Norman Housley	BC121B	978-4967	norman@vm.utcs.utoronto.ca
Information Centre	Don Gibson	BC217	978-7331	don@vm.utcs.utoronto.ca
Internal Systems Support	Ron Vander Kraats	BC121A	978-4428	rvk@vm.utcs.utoronto.ca
Operations Support	Dr. Bob Chambers	MP350	978-7092	
Systems Support	Bill Lauriston	MP331	978-3579	bill@vm.utcs.utoronto.ca

Committees on Computing

Supercomputer Users' Group at U of T	Chair	Prof. W.R. Peltier	978-2938
Research Board Standing Committee on Computing	Chair	Prof. C.C. Gotlieb	978-2986

Legend:
BC = Bancroft Building
ER = Erindale
MP = McLennan Physical Labs

* NetNorth/BITNET/EARN

Terminal & Advising Sites

Names and Locations

Central Advising Office (CAO), 978-HELP
Engineering Annex (EA, CDF), 11 King's College Road, Rooms 107, 107B, 201
Erindale College (Erin), 828-5339, 3359 Mississauga Road North, Erindale Campus, Rooms 2037, 2039A-B-C, 2045
Ramsay Wright, 25 Harbord St., Rooms 211, 212, 213
Robarts, Robarts Library, 130 St. George St., Room 1061A
Sidney Smith (Sidney), 100 St. George St., Room 1071
St.Michael's College, 121 St. Joseph St., Room 107
Trinity College, 6 Hoskin Ave., Room 024
Victoria University, 73 Queen's Park Cres., Room 208

Access Hours

Sites	Hours of Access				Restrictions*	Advising
	Mon-Thurs	Fri	Sat	Sun		
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	No
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Erin (2039)Δ	9:00-17:00	9:00-17:00	12:00-16:00	12:00-16:00	Research	Rm 2005
(2045-46-47)	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	Rm 2005
(235)†	8:00-22:00	8:00-17:00	closed	closed	None	Rm 2046
Robarts	8:30-24:00	8:30-24:00	9:00-22:00	13:00-22:00	None	978-HELP for Research
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
St.Michael's	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Trinity	8:00-22:00	8:00-22:00	8:00-22:00	8:00-22:00	None	978-HELP for Research
Victoria	8:30-21:00	8:30-21:00	8:00-13:00	8:00-13:00	None	978-HELP for Research

Sites	Advising Hours
CAO	Monday through Friday, 10:00 - 18:00
Erin	Monday through Friday, 09:00 - 22:00

Legend

* Research includes graduates, faculty, staff.
Δ Key access available.
† Access restricted to building hours.

Computer and Printer Access

Sites	PACX	Printers	CDF/PC Microcomputers	CQUEST Workstations
CDF	N	Y	N	
EA	Y	Y	N	
Erin	Y	Y	N	
Ramsay Wright		Y**		Y
Robarts	Y	Y	Y †	
Sidney	N	Y	Y††	Y
St.Michael's	Y	Y	Y††	
Trinity	Y	Y*	Y††	
Victoria	Y	Y*	Y††	

(Y=yes, N=no)
* CDF PC only ** Site Only † NEC †† TI PC

UTCS Site Licenses

UTCS administers a number of software site licenses available to the University of Toronto community. (Usually, this means faculty, staff, and graduate students, though some licenses apply to undergraduate students also. See "Restrictions" in the table below.) The licenses provide a variety of software at much-reduced cost. The majority of the licenses must be renewed each year. Most are terminated when you leave U of T.

Each license has a contract that you must complete. It outlines your responsibilities and any limitations in the use of the software. Except for ProComm, the contracts and software are available from the UTCS Information Office, 4 Bancroft Avenue, Room 201. ProComm is available from the UTCS Advising Office, 978-HELP. To qualify as a member of the U of T community, you must provide a valid Employee number or Student number.

The table below describes the available site licenses. The Restrictions column specifies who may purchase the license. If the restriction is Research, the payment must come from research money. The Diskettes column describes how you actually receive the software. Large packages, like SAS and SPSS, require that you borrow the diskettes, install the software, and return the diskettes. Smaller packages, consisting of up to five diskettes, either require you to bring your own diskettes or include the cost of the UTCS-supplied diskettes in the license fee.

For more detailed information about these site licenses, telephone the UTCS Information Office at 978-4990.

Site Licenses at UTCS

Product Name	***Archivist***	***Chaos in the Classroom I: Maps and Bifurcations***	***ProComm***
System	PC; Text management	PC;	PC; Communications
Restrictions	Faculty, Staff, Graduate Students	Faculty, Staff, Graduate Students	Faculty, Staff, Graduate Students, Undergraduate
Cost	$40	$12	Free
License Period	One-time fee	One-time fee	N/A
Diskettes	One 5.25"; bring own	One 5.25" or one 3.5"; bring own	Two 5.25"; bring own
Documentation Available at UTCS	No	Yes	On disk; part of package
Product Name	***QuickMail***	***SAS/PC***	***SAS/PC network***
System	Mac; Electronic mail	PC; Statistical analysis	PC; Statistical analysis
Restrictions	Faculty, Staff	Faculty, Staff, Graduate Students, Undergraduate	Faculty, Staff, Graduate Students
Cost	$35 per user Upgrades: $10	BASE/STAT/GRAPH/FSP: $70; IML module: $20; ETS module: $35.	$35 per station
License Period	One-time fee	July 1-June 30	July 1-June 30
Diskettes	One 3.5"; bring own	Deposit per binder Maximum $350	Deposit per binder Maximum $350
Documentation Available at UTCS	No	Yes	Yes

Site Licenses at UTCS *cont.*

Product Name	***SAS/UNIX***	***SPSS/PC***	***SYSTAT***
System	UNIX; Statistical analysis	PC; Statistical analysis	Mac; Statistical analysis
Restrictions	Faculty, Staff, Graduate Students	Research	Faculty, Staff, Graduate Students
Cost	$150 BASE; $50 ea. FSP, IML modules	$100	$100
License Period	July 1-June 30	Nov 1-Oct 31	July 1-June 30
Diskettes	Tape cartridge	Deposit $25 per box; 2-3 boxes	Five 800KB 3.5" diskettes; bring own
Documentation Available at UTCS	Yes	No	Yes

Product Name	***WATFOR-77***	***WordPerfect***	
System	PC; FORTRAN compiler	PC; Word Processing	
Restrictions	Research	Faculty, Staff	
Cost	$35 [$35 WATFOR-87 (math co-processor)]; Add $5 GKS (Graphics Kernal System)	New: $65 Upgrade: $10	
License Period	July 1-June 30	One time fee	
Diskettes	Two-three 5.25" diskettes; bring own	Deposit $25 per box; 1 box	
Documentation Available at UTCS	Yes	Yes	

Vendor-produced documentation may be ordered through the UTCS Information Office, Room 201, 4 Bancroft Avenue. UTCS documents and selected vendor documents are also stocked there for purchase. For more information on prices, call 978-4990. Whenever feasible, documents are made available online, and users are encouraged to print their own copies. On the VM machine, a special command has been provided for this purpose.

To print online documents on:	*IBM VM/CMS*	*GP UNIX*
	Type "help document"	Use *ipr* command

The following examples relate to the table below. The document to be printed is the UTCS Guide to Census Tapes, called CENSUS LISTING on CMS and /usr/doc/utcs/census on GP UNIX.
<RETURN> means RETURN or ENTER key.

CMS:

```
document <RETURN> <RETURN>
laser census listing (forms yxle <RETURN>
```

GP UNIX:

```
nohup ipr -8p -fyxle /usr/doc/utcs/census & <RETURN>
```

UTCS Documents online

UTCS Rate Schedule (Commercial)
UTCS Rate Schedule (External)
UTCS Rate Schedule (Internal)

Academic's Guide to Microcomputer Systems
Character Sets for Highspeed Printing
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics
UTCS GUIDE TO PRODUCTS AND SERVICES: Accounting
UTCS Catalogue: Numerical Products
UTCS Catalogue: Statistics Products

UTCS Guide to Census Tapes
UTCS Guide to Kermit
UTCS Guide to Micro File Transfer Service
UTCS Guide to Text Processing on GP UNIX

UTCS Documents in hardcopy

	CMS LISTING	GP UNIX	Forms Code
Previously Announced:			
UTCS Guide to Highspeed Printing	PRINT		*
UTCS Guide to VM/CMS	CMSGD		*
UTCS Guide to WScript	WSCRIPT		*
VMTAPE Messages and Codes	VMCMSGS		YXOE
VMTAPE User's Guide	VMCUSER		YXOE
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction	INTRO	/usr/doc/utcs/intro	*
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics	BASICS	/usr/doc/utcs/basics	*
UTCS Catalogue: Access, Part 1	ACCESS1	/usr/doc/utcs/access1	*
UTCS Catalogue: Access, Part 2		/usr/doc/utcs/access2	*
Product-Function List	STATLIST		BXQD
UTCS Guide to BMDP	BMDP		*

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* *Recommended forms code for the 8700 is YXLE unless otherwise stated.*

UTCS Documents in hardcopy *cont.*

	CMS LISTING	GP UNIX	Forms Code
UTCS Catalogue: Numerical Products	NUMCAT		*
Product-Function List	NUMLIST		BXQD
UTCS Catalogue: Statistics Products	STATCAT		*
UTCS Guide to Census Tapes	CENSUS	/usr/doc/utcs/census	*
Recipes for Using Tapes on VM/CMS	QUIKTAPE		*
UTCS Guide to FORTRAN on VM/CMS	FORTRAN		*
UTCS Guide to GP UNIX		/usr/doc/utcs/gpunix	*
UTCS Guide to Kermit	KERMIT	/usr/doc/utcs/kermit	*
UTCS Guide to SAS	SAS		*
UTCS Guide to Series/1 Terminal Use	SERIES		*
3270 Emulation:			
Cybernex APL100 and Volker Craig VC404	CYBER		*
DM1520	DM1520		*
Hardcopy Terminal	HARDCOPY		*
IBM 3101	IBM3101		*
IBM PC Kermit	PCKERMIT		*
SOROC IQ	SOROC		*
VT52	VT52		*
VT100	VT100		*
UTCS Guide to SPSS	SPSS		*
UTCS Guide to Text Processing on GP UNIX		/usr/doc/utcs/text	YXOG

Other Documentation online

	CMS LISTING	GP UNIX	Forms Code
Electronic Mail			
A User's Guide to Electronic MAIL	MAILBOOK		YXOC
Kermit			
Kermit Protocol Manual	KERMITPM		YXOE
Kermit User Guide	KERMITUG		YXOF
ProComm			
ProComm Reference Manual	PROCOMM		YXOE
VMBATCH Documents			
VMBATCH User's Guide	VMBATCH		YXOA
VMBATCH Messages and Codes	VMBATMC		YXOA
VMSECURE			
VMSECURE User's Guide	VMSECURE		YXOE
VM Tape Documents			
TapeMap User's Guide and Reference	TAPEMAP		*
Waterloo SCRIPT			
Reference Manual	WSCRPTRF		YXLC
User's Guide	WSCRPTUG		YXLC
Using SCRIPT in MVS/TSO	WSCRPTSO		YXLC
Waterloo SCRIPT and a PostScript Printer	WSCRPTPS		YXLC
Formula Processor Summary	WSCRPTFP		YXLC
GML User's Guide	GMLUG		YXLC
GML Reference Summary	GMLRFSUM		YXLC

** Recommended forms code for the 8700 is YXLE unless otherwise stated.*
† Use the 87set command. Type "help 87set".

Software List for Microcomputers

The following are microcomputer software packages for which UTCS can provide either support or some information. As with mainframe products, micro packages receive full support (Class A), limited support (Class B), or no active support (Class C). The specific criteria differ from those for mainframe classes and are outlined in the Academic's Guide to Microcomputer

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Package/Compiler	Version	Environment	Support
Application Development Tools			
Assembler			
Microsoft Assembler	5.1	MS-DOS 3.3 & OS/2	B
MPW Assembler	2.0.2	Macintosh	B
BASIC			
GW BASIC	—	MS-DOS	B
C			
Microsoft C	5.1	MS-DOS	B
MPW C	2.0.2	Macintosh	B
WATCOM C & Express C	6.0	MS-DOS	B
Modula-2			
JPI Top Speed Modula-2	1.17	MS-DOS	B
Metacom Modula-2	1.0	Macintosh	C
FORTRAN			
IBM FORTRAN/2	1.0	MS-DOS 3.3 & OS/2	B
Language Systems FORTRAN	1.0	Macintosh	C
Microsoft FORTRAN	4.0	MS-DOS	B
WATCOM WATFOR-77	3.0	MS-DOS	A
Pascal			
MPW Pascal	2.0.2	Macintosh	C
TURBO Pascal	—	MS-DOS	B
Tools			
ResEdit	1.2d0	Macintosh	B
HyperCard	1.2.1	Macintosh	A
Macintosh Programmer's Workshop	2.0.2	Macintosh	B
SuperCard	1.0	Macintosh	B
WATCOM GKS	1.3	MS-DOS	B
Communications			
File Transfer & Terminal Emulators			
Kermit	0.8(35)	Macintosh	A
Kermit	2.30	MS-DOS	A
DeskLink	2.21c	MS-DOS	B
Lap-Link Mac	2.00a	Macintosh	B
Lap-Link PC	2.16	MS-DOS	B
MacTerminal	2.2	Macintosh	B
PC TALK3	—	MS-DOS	C
PC PLOT III	—	MS-DOS	C
ProComm	TU 2.4.2	MS-DOS	A
Red Ryder	10.3	Macintosh	B
Remote^2	1.01	MS-DOS	B

Software List for Microcomputers *cont.*

Package/Compiler	Version	Environment	Support
Network Systems			
3COM PLUS	1.3.1	MS-DOS	B
AppleShare	2.0.1	Macintosh	B
Novell Advanced Netware	2.15	MS-DOS	B
PC LAN	1.3	MS-DOS	B
STARLAN	3.1	MS-DOS	B
Tapestry II	1.1B	MS-DOS	B
TOPS	2.1	Macintosh	B
TOPS	2.1	MS-DOS	B
TOPS NetPrint	2.1	MS-DOS	B
Network System Utilities			
Inter•Poll	1.0	Macintosh	B
Database Managers			
4th Dimension	Int. 1.03	Macintosh	B
Archivist	1.02b	MS-DOS	B
AskSam	4.2	MS-DOS	B
Clipper	S87	MS-DOS	B
DATAEASE	2.5R3	MS-DOS	B
dBASE IV	1.0	MS-DOS	A
FoxBASE Mac	2.0	Macintosh	A
Notebook II	2.03	MS-DOS	C
Oracle	5.1B	MS-DOS	B
Oracle for Macintosh	1.1	Macintosh	B
R & R Report Writer	3.0	MS-DOS	C
Desktop Publishing			
Fontographer	n/a	Macintosh	C
PageMaker	3.02	Macintosh	A
PageMaker	3.0	MS-DOS	A
PageMaker	3.0	OS/2	C
Quark XPress	1.0	Macintosh	C
Ready,Set,Go!	4.0	Macintosh	C
Ventura	2.0	MS-DOS	B
Electronic Mail			
Microsoft Mail	1.36	Macintosh	B
QuickMail	1.0	Macintosh	B
Graphics			
Charting			
35mm Express	4.02	MS-DOS	B
Cricket Graph	1.2	Macintosh	C
Freelance Plus	3.0	MS-DOS	B
Harvard Graphics	2.1	MS-DOS	B
Lotus 1-2-3	2.01a	MS-DOS	B
Microsoft Excel	1.5	Macintosh	B
Microsoft Excel	2.0	MS-DOS	B
SigmaPlot	—	MS-DOS	C
Draw and CAD			
Aldus Freehand	1.0	Macintosh	B
Cricket Draw	1.1	Macintosh	C
Generic CADD	3.0	MS-DOS	C
MiniCad	4.05	Macintosh	C
Illustrator	1.0	Macintosh	B
Illustrator88	1.6	Macintosh	B
MacDraft	1.2b	Macintosh	C
MacDraw	1.95	Macintosh	A

Software List for Microcomputers *cont.*

Package/Compiler	Version	Environment	Support
MacDraw II	1.0v1	Macintosh	B
Windows Draw	1.02	MS-DOS	C
Image and Scanning			
Corel Draw	1.00	MS-DOS	B
ImageStudio	1.05	Macintosh	B
Publish Pac	2.0	Macintosh	B
Publish Pac	2.1	MS-DOS	B
Text Pac	2.0	MS-DOS	B
Paint			
DR HALO	1.23	MS-DOS	C
MacPaint	2.0	Macintosh	A
Microsoft Paintbrush	2.0	MS-DOS	C
PC Paintbrush	2.5	MS-DOS	C
SuperPaint	1.1	Macintosh	B
Windows Paint	2.03	MS-DOS	C
Plotting Subroutines			
WATCOM GKS	1.3	MS-DOS	B
Numerical			
Derive	1.14	MS-DOS	C
Eispack	n/a	MS-DOS	C
Eureka	n/a	MS-DOS	C
GAUSS	2.0	MS-DOS	B
Linpack	n/a	MS-DOS	C
MathCAD	2.0	MS-DOS	C
muMATH-83	4.12	MS-DOS	C
NAg Workstation Library	Rel. 1	MS-DOS	A
Solver-Q	---	MS-DOS	C
Operating Systems			
IBM PC, PS/2, and compatibles			
IBM OS/2 Extended	1.1	n/a	B
IBM PC-DOS	4.0	n/a	B
Microsoft MS-DOS (incl IBM PC-DOS)	3.3	n/a	A
Microsoft Windows 286	2.1	MS-DOS	A
Microsoft Windows 386	2.1	MS-DOS	A
Microsoft Windows	3.0	MS-DOS	A
Macintosh II, Macintosh SE, and Macintosh Plus			
A/UX (Unix)		n/a	C
Finder	6.0.5	n/a	A
MultiFinder	6.0.5	n/a	A
System	6.0.5	n/a	A
NeXT			
NeXT	1.0	n/a	B
Sound			
SoundWave	1.0	Macintosh	B
MacRecorder	1.0	Macintosh	B
Spreadsheet			
HAL	1.0	MS-DOS	B
Lotus 1-2-3	2.01a	MS-DOS	B
Microsoft Excel	1.5	Macintosh	B
Microsoft Excel	2.0	MS-DOS	B

Software List for Microcomputers *cont.*

Package/Compiler	Version	Environment	Support
Statistical			
BASS	88.10	MS-DOS	C
MACSPIN	1.5	Macintosh	C
Minitab	82.1.1	MS-DOS	C
PowerStat	1.04	MS-DOS	C
SAS/PC	6.03	MS-DOS	A
SPSS/PC+	3.0	MS-DOS	A
STATPRO	2.0c	MS-DOS	C
STATWORKS	1.2	Macintosh	B
SYSTAT	3.2	Macintosh	B
SYSTAT	3.2	MS-DOS	B
Word Processing			
Guide	2.0	MS-DOS	C
MacWrite	5.01	Macintosh	B
Manuscript	2.0	MS-DOS	C
Microsoft Word	3.02 & 4.0	Macintosh	A
Microsoft Word	4.0 & 5.0	MS-DOS	A
MIcrosoft Word for Windows	1.0	MS-DOS	B
Nota Bene	3.0	MS-DOS	B
Nota Bene SLS	3.0	MS-DOS	B
PC-TeX	2.1	MS-DOS	B
Sprint	1.0	MS-DOS	B
WordPerfect	5.0 & 5.1	MS-DOS	A
WordPerfect	1.0	Macintosh	C
WordPerfect Library	2.0	MS-DOS	C
WordStar	3.3 & 5.5	MS-DOS	C
Utilities			
Apple Turnover	—	MS-DOS	A
Fastback MAC	2.0	Macintosh	B
Fastback Plus	2.0	MS-DOS	B
Norton Utilities	4.5	MS-DOS	A
Copy II MAC	7.2	Macintosh	B
Mace Utilities Gold	—	MS-DOS	B
MacZap	5.1	Macintosh	B
Retrospect	1.0	Macintosh	B
Sidekick for PM	1.0	OS/2	C
StuffIt	1.5.1	Macintosh	A
XenoCopy PC	1.117	MS-DOS	A
386MAX	4.0	MS-DOS	B

Software List for Mainframe Computers: VM/CMS, UNIX

Each programming language or package available at UTCS has a support level. In general, Class A Products receive full support, Class B limited support (as time and resources allow), Class C no active support.

For complete details of UTCS product support policy, see the UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction.

Package/Compiler	Version	Environment	Support
Communications			
FTP	VM/CMS	C	1.2.1
Kermit	VM/CMS	A	---
Kermit	UNIX	B	4C(058)
FTS	VM/CMS	A	---
MAIL/MAILBOOK	VM/CMS	A	86.359
macget/macput	UNIX	C	---
netcopy, netexec, to (NetNorth Tools)	UNIX	B	---
xmodem	UNIX	C	---
ftp,rsh,rlogin,telnet,rcp (Access via TCP/IP to most of the networked machines on all three campuses)	UNIX	B	---
rn/Pnews	UNIX	B	---
mail,mh,Mail	UNIX	-	---
TELNET	VM/CMS	C	1.2.1
Graphics			
PLOTBASIC (FORTRAN)	VM/CMS	C	---
SAS/GRAPH	VM/CMS	A	5.18
Languages			
ASSEMBLER(F)	VM/CMS	C	---
Concurrent Euclid	VM/CMS	C	1.9
FORTUTILS	VM/CMS	A	2.2
PL/I OPT Compiler	VM/CMS	B	1.5.1
REXX	VM/CMS	A	---
SNOBOL 4	VM/CMS	C	3.5
Turing	VM/CMS	C	---
VS FORTRAN	VM/CMS	A	1.4.1
VS Pascal	VM/CMS	C	2.2
Waterloo C	VM/CMS	C	1.3
WATFIV	VM/CMS	C	V2L0
WATFOR-77	VM/CMS	A	1.3
cc	UNIX	A	---
f77	UNIX	C	---
ratfor	UNIX	C	BSD std.
ttc	UNIX	C	---
pc	UNIX	C	BSD std.
yacc	UNIX	C	---
awk	UNIX	C	---
adb,dbx	UNIX	C	BSD std.

Software List for Mainframe Computers *cont.*

Package/Compiler	Version	Environment	Support
Numerical			
IMSL	VM/CMS	A	9.2,10.0
LINPACK	VM/CMS	C	---
MINOS	VM/CMS	C	5.1
MINPACK	VM/CMS	C	---
NAg	VM/CMS	A	Mark 11, 13
Statistical			
BMDP	VM/CMS	A	Level 85, Level 87
Minitab	VM/CMS	B	5.1
NAg	VM/CMS	A	Mark 11, 13
NTSYS	VM/CMS	C	1987
SAS	VM/CMS	A	5.18
SPSS^{x}	VM/CMS	A	3.1
Text Processing			
SCRIBE	VM/CMS	C	4(1400)-1
Waterloo SCRIPT	VM/CMS	B	86.1
XEDIT	VM/CMS	A	---
8700 Pseudotypesetting	VM/CMS	C	n/a
MICROLASER	VM/CMS	C	---
ed	UNIX	A	---
vi	UNIX	C	---
cmacs	UNIX	C	---
spell	UNIX	C	---
diction/explain	UNIX	C	---
eqn	UNIX	B	---
tbl	UNIX	B	---
pic	UNIX	C	---
troff	UNIX	B	---
nroff	UNIX	B	---
TeX	UNIX	C	---
Utilities			
FORTUTILS	VM/CMS	A	2.2
TPRINT	VM/CMS	C	---
TCOPYNL	VM/CMS	B	---
TCOPYSL	VM/CMS	B	---
crypt	UNIX	A	BSD std.
compress	UNIX	C	BSD std.
csh	UNIX	B	BSD std.
diff	UNIX	A	BSD std.
grep	UNIX	A	BSD std.
ipr	UNIX	B	---
learn	UNIX	C	BSD std.
patch	UNIX	C	---
sed	UNIX	A	BSD std.
sort	UNIX	A	BSD std.
sh	UNIX	A	BSD std.
tar	UNIX	A	BSD std.
uniq	UNIX	A	BSD std.

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